MONTHLY WEATHER REVIEW.

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VOL. XXXI. AUGUST, 1903. No. 8

INTRODUCTION.

The MONTHLY WEATHER REVIEW for August, 1903, is based on data from about 3300 stations, classified as follows:

Weather Bureau stations, regular, telegraph and mail, 160; West Indian Service, cable and mail, 8; River and Flood Service, 52, river and rainfall, 177, rainfall only, 62; voluntary observers, domestic and foreign, 2565; total Weather Bureau Service, 2962; Canadian Meteorological Service, by telegraph and mail, 20, by mail only, 13; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 75; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25; The New Panama Canal Company, 5; Central Meteorological Observatory of Mexico, 20 station summaries, also printed daily bulletins and charts, based on simultaneous observations at about 40 stations; Mexican Federal Telegraph Service, printed daily charts, based on about 30 stations.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Territorial Meteorologist, Honolulu, H. I.; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander W. H. H. Southerland, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. M. Shaw, Esq., Secretary, Meteorological Office, London; Rev. Josef Algué, S. J., Director, Philippine Weather Service; and H. H. Cousins, Chemist, in charge of the Jamaica Weather Office.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or 10h 30m west of Greenwich. The Costa Rican standard of time is that of San José, 0h 36m 13s slower than seventy-fifth meridian time, corresponding to 5h 36m west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

THE WEST INDIAN HURRICANE OF AUGUST 8-15, 1903.

The most important tropical storm that has appeared in North American waters since September, 1900, advanced from Barbados, West Indies, over the Caribbean Sea and the Gulf of Mexico from the 8th to the 15th.

The first indication of the presence of this storm to the eastward of Barbados was furnished by the morning telegraphic reports of the 8th. West Indian stations and Gulf and Atlantic coast shipping interests were at once notified that a disturbance probably of dangerous strength was approaching Barbados from the eastward and would move northwestward over the Windward Islands. Thereafter daily until the 14th, West Indian, Gulf, Atlantic stations, and shipping interests were advised of the apparent location and character and the probable course of the storm, and as it passed westward over the Caribbean Sea hurricane warnings were ordered at Gulf and southern Florida stations. The storm increased in strength as it advanced in a north of west course over the Caribbean Sea, and apparently attained its maximum intensity as it approached the Yucatan Channel.

Martinique appears to have been the only island of the Windward Group that suffered serious damage. The vortex of the storm passed over or near that island moving in a northwesterly direction during the night of the 8-9th, unroofing several hundred houses, destroying crops, and damaging a number of sailing vessels.

During the next two days the center of the storm was far distant from any station of observation. Shipping interests and West Indian stations were, however, advised that while reports from that region were missing a disturbance of apparently marked energy was moving north of west over the Caribbean Sea near Santo Domingo. On the morning of the 11th the presence near Jamaica of a storm of great intensity was indicated and advices to that effect were issued with a warning that it was considered dangerous for vessels of all classes to sail for Gulf, Cuban, and South Atlantic ports.

Reports from Kingston, Jamaica, show that the first effects of the storm were felt on that island on the 10th, and that the main hurricane center reached the island on the morning of the 11th, causing a heavy loss of life and property. At Kingston the minimum barometer, 28.80 inches, as indicated by the barograph, occurred at 5:30 a. m. of the 11th, and at 6:15 a. m. the barometer had risen to 29.36 inches. The anemometer cups were disabled, but the maximum wind velocity at Kingston was estimated at 65 miles an hour. The principal sufferers were the owners of banana plantations whose losses were estimated at more than £500,000. The orange, pimento, and coffee crops suffered severely; the towns of Port Antonio and Port Maria were almost destroyed, and throughout the parishes of St. Mary, Portland, St. Andrew, St. Catherine, and St. Thomas the destruction to houses, property, and plantations was appalling. Kingston, with the exception of damage to houses and warehouses on the sea front, suffered less than any other place on the island.

But little information is available for determining the character and course of the storm after it passed Jamaica. Warnings were, however, issued that the storm was severe and likely to enter the Gulf of Mexico. Later advices show that the Cayman Islands were devastated on the evening of the 11th. Captain Hunter of the schooner *Gov. Blake* has furnished notes regarding the storm at Georgetown, Grand Cayman Island. According to his observations the 8th and 9th were clear and bright at Grand Cayman Island. The 10th was unusually warm with a north-northeast wind that freshened steadily. In the afternoon the weather became cloudy and a little rain fell in the evening. From 8 a. m. to 8 p. m., local time, the barometer fell from 29.80 to 29.70 inches. At 1 p. m. of the 11th the barometer read 29.50 inches, the wind was blowing about 30 miles an hour from the north-northeast, and the sky was covered with thick, black clouds from the same quarter. At 4 p. m. the wind was blowing about 45 miles an hour, and at 5 p. m., with the barometer at 29.30 inches, the wind was blowing in heavy gusts at 65 miles, and the clouds hung so low that they seemed to almost touch the tree tops. At 7 p. m. the roaring of the wind began, and at 8 p. m., with the barometer reading 29.00, the wind blew at 90 miles an hour in terrific gusts that churned up the water in the harbor of Georgetown and blew out to sea or capsized several vessels. At this time, 8 p. m., it was supposed that the worst of the storm had passed, but soon the barometer began to fall so rapidly that the needle of the aneroid could be seen to move. The barometer fell until 10 p. m. when it stood at 28.30 inches, with the wind blowing 110 to 120 miles an hour from east-northeast to east-southeast in gusts. About midnight it became almost calm for about thirty minutes, after which the wind came on fiercely from the southeast. At 1 a. m. of the 12th the barometer began to rise, and at 6 a. m. it read 29.30, and at noon 29.70. From midnight until 4 a. m. heavy rain continued in drops as large as gravel stones and with nearly the same abrasive effect. When the sun came out on the morning of the 12th a most desolate sight was presented. Every tree and plant on the island was either blown away or had its leaves and small branches stripped off, and crops were entirely destroyed. About 200 houses were blown down or unroofed, seven out of eight churches on the island were destroyed, vessels on the stocks were picked up and dashed to pieces, and of the 23 vessels in the harbor of Georgetown but one, the *Gov. Blake*, was saved. Most of the crews on board perished, but no one on shore was killed. The wind exhibited some curious freaks, totally demolishing some houses while others close by were not damaged.

Havana, Cuba, reports of the 12th indicated the approach of the storm center toward the southeastern part of the Gulf of Mexico, and advices to this effect were issued. On that date some destruction by high wind was caused to buildings and crops in the province of Pinar del Rio, Cuba.

Reports from Havana on the morning of the 13th appeared to locate the center of disturbance in the southeastern part of the Gulf of Mexico. A report received late in the day from Progreso, Yucatan, indicated that the center of the storm was near the northeast coast of Yucatan, and heavy sea swells were reported at Pensacola, Fla., and Fort Morgan, Ala. Reports from various sources indicate that the storm was very severe on the Yucatan coast and adjacent waters of the Gulf during the 13th. The captain of the steamship *Navarre* reports that he left Vera Cruz, Mexico, at 11 a. m., August 12, course 62° north, barometer 30.04, weather fine, and fresh breeze from east-northeast. At 1 a. m. of the 13th, when approaching The Triangle on the border of Campeachy Banks, the weather, though still fair, began to change, particularly in the north-northeast, where the sky was copper colored. The barometer had fallen to 29.88, with some heavy showers from the north-northeast, and a slight swell from the northeast.

At 5 a. m., in 21° 24′ north, 94° west from Paris (91° 40′ west from Greenwich), a squall from the northeast struck the vessel, the sea became heavy, the barometer had fallen to 29.76, the sky was overcast, and the wind increased in strength and shifted to north-northeast, to return to northeast at 11 a. m. At noon, in 21° 58′ north, 90° 5′ west from Greenwich, the weather had become stormy, the sea rougher and rougher, and by 2 p. m. the wind had increased to hurricane force from the northeast, the vessel was head on the waves, and the barometer had fallen to 29.61.

Between 3 and 6 p. m., when 15 miles south of the Alacranes, the hurricane was encountered in its full fury, the barometer reading 29.45, and the sea exceedingly rough. At 7 p. m. the worst of the storm had passed, the wind had shifted to the eastward, and the sea became less rough. At 8 p. m., in north 22° 25′, west 89° 5′ from Greenwich, the barometer had risen to 29.65, the wind had changed to east-northeast, and the sea had become calmer. At 11 p. m. the steamer resumed its usual speed, and continued on its course with fair weather.

Following a north of west course the vortex of the storm apparently reached the coast of Tamaulipas, Mexico, on the 15th, where it dissipated. Attending its passage many vessels were cast ashore on the coast of Yucatan, shipping and property were damaged from Yucatan to Tampico, and large tracts of the southern Gulf coast were submerged.

The approximate path of this hurricane from the 8th to the 15th is shown on Chart No. X.

When the fact is considered that, except during its passage over Jamaica, the hurricane center did not come within the region of telegraphic observation the difficulty experienced in defining its probable future course will be appreciated. With the ever present probability of a northward recurve of the storm, shipping interests were daily advised of the danger of sailing for southern waters that lay in its possible line of advance, and many disasters were doubtless averted by an observance of the warnings.

Freshets occurred at intervals during the month in the streams of the lower Missouri Valley.

On the 4th storm warnings were ordered from New Haven, Conn., to Boston, Mass., and during the 5th a northeast gale caused damage to small vessels along the southern New England coast. From the 29th to 31st strong easterly winds prevailed on the middle Atlantic and southern New England coasts.

No serious damage by frost was reported during the month.

BOSTON FORECAST DISTRICT.

Local storms of marked violence occurred on the 5th and 19th, the former covering a large portion of Connecticut, while the latter was most severe in Vermont. A northeast gale, with rain and fog, prevailed along the coast on the 29th and 30th, delaying shipping and causing some damage to small craft. Timely warnings were diplayed in connection with the storms, and no destructive winds occurred without warning.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

Advisory warnings concerning the tropical hurricane that moved westward across the Caribbean Sea and the Gulf of Mexico proved of great value to shipping interests. Much damage was sustained by vessels that sailed into this storm, and several were reported lost. Many vessels remained in port until it was evident that they could pursue their course without danger.—*I. M. Cline, District Forecaster.*

CHICAGO FORECAST DISTRICT.

No storm warnings were displayed during the month, but advisory messages for severe local squalls were sent to most of the Lake ports August 5, and to those on Lake Superior on the 17th. On the night of the 20th advisory messages were sent to Lake Superior points for southerly gales, due to the approach of a storm of decided energy which had formed in Assiniboia.

The atmospheric conditions on the 5th were quite critical for a large portion of the Lake district, the oscillations of pressure being remarkably great. At Chicago a fall of about .20 inch occurred between 11 a. m. and 12 noon, and then again about .11 inch from 1:30 to 2:15 p. m. Severe squalls resulted in this vicinity and in the surrounding country. Several seiches occurred on southern Lake Michigan, the water rising and falling a number of times during the day. The lowest point reached at Chicago was 2.5 feet below normal and the highest 2.5 above, a fluctuation of 5 feet.

Except two warm periods, 3d to 5th, and 21st to 23d, the month was unusually cool throughout the district.

Heavy rainfalls occurred quite frequently during the month, the most marked periods being in the Missouri Valley, Kansas, and upper Mississippi Valley on the 1st; the upper Mississippi Valley and Lake region on the 3d; Illinois and the Ohio Valley on the 5th, and the Missouri and central Mississippi valleys on the 24th. The most pronounced heavy rains for a number of years began on the eastern Rocky Mountain slope on the 25th, and extended from that section eastward to the Atlantic coast during the 26th, 27th, and 28th. A number of stations in eastern Nebraska, northern Missouri and southwestern Iowa reported from 5 to 7.5 inches of rainfall in twenty-four hours.—*F. J. Walz, Inspector.*

DENVER FORECAST DISTRICT.

The month was not marked by unusual conditions.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

On the 18th local storms occurred in southern California, and in places in San Bernardino County trees were uprooted by the wind. Some buildings were struck by lightning, but the damage was not great.—*A. G. McAdie, Professor of Meteorology.*

PORTLAND, OREG., FORECAST DISTRICT.

No storms or frost occurred and no warnings were issued.—*E. A. Beals, District Forecaster.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	4, a. m.	47	123	8, p. m.	41	72	3,025	4.5	672	28.0
II	8, a. m.	45	123	16, p. m.	46	60	4,725	8.5	556	23.2
III	16, p. m.	47	88	19, p. m.	46	60	1,925	3.0	642	26.8
IV	17, a. m.	53	122	21, p. m.	35	75	3,000	4.5	667	27.8
V	25, p. m.	53	108	29, p. m.	46	60	2,475	4.0	619	25.8
VI	27, a. m.	54	114	4, a. m.*	41	72	3,125	8.0	391	16.3
Sums							18,275	32.5	3,547	147.9
Mean of 6 paths							3,046		591	24.6
Mean of 32.5 days									562	23.4
Low areas.										
I	1, a. m.	37	120	8, a. m.	46	60	4,000	7.0	571	23.8
II	6, p. m.	39	108	8, p. m.	35	94	900	2.0	450	18.8
III	7, p. m.	50	97	10, p. m.	46	60	1,975	3.0	658	27.4
IV	8, p. m.	48	104	12, p. m.	48	68	2,225	4.0	556	23.2
V	17, a. m.	51	104	19, a. m.	48	68	1,625	2.0	812	33.8
VI	17, p. m.	37	120	22, p. m.	48	68	3,200	5.0	640	26.7
VII	24, p. m.	41	117	29, a. m.	37	75	2,900	4.5	644	26.9
Sums							16,825	27.5	4,331	180.6
Mean of 7 paths							2,403		619	25.8
Mean of 27.5 days									611	25.5

*September.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*George E. Hunt, Chief Clerk, Forecast Division.*

RIVERS AND FLOODS.

Frequent and copious rains over the Missouri and upper Mississippi watersheds during the month prevented the usual seasonal decline in the rivers of those districts, and their mean stages were somewhat higher than during the preceding month, as well as considerably above the normal August stages.

The lower Mississippi fell almost steadily throughout the month, but no low water was experienced in any locality. The stages of the Ohio River and its tributaries were fairly satisfactory for all purposes except those of the upper Tennessee River, where low water necessitated a suspension of navigation for about one-half of the month.

On the 28th and 29th there were heavy rains over the upper Susquehanna watershed, and the river began to rise rapidly on the 29th. At Wilkesbarre, Pa., the river rose 14.6 feet from the 28th to the 30th, inclusive, with a maximum stage of 20 feet, or 3 feet above the danger line. Warnings of the coming rise were issued on the previous day, the water then standing at 7.3 feet.

Heavy rains fell over Texas during the last week of July, the amounts over the middle drainage basins of the Colorado and Brazos rivers ranging from 3 to 9 inches. The result was a marked rise in the rivers, necessitating the issue of flood warnings, beginning on July 29. The following report on these floods was prepared by Mr. L. H. Murdoch, Section Director, in charge of the United States Weather Bureau office at Galveston, Tex.:

Heavy rains began to fall over Texas on July 25, and by the 29th and 30th the middle drainage basins of the Colorado and Brazos rivers had received between 3 and 9 inches of precipitation. On the 29th the following warning was telegraphed to interested places on the Colorado River:

"Heavy floods will occur in streams emptying into the Colorado River near Austin, causing a marked rise in the Colorado River at Austin by Friday (in two days)."

On July 30 the following was telegraphed to interested localities along the Brazos River:

"Heavy floods will occur in streams emptying into the Brazos River between Waco and Hempstead, causing a decided rise in the Brazos River within the next few days."

The rise in the Colorado River at Austin was less than expected and unimportant, but a few miles below that place the river rose rapidly and left its banks. On the 30th a special observation telegraphed from Columbus showed a stage of 28.2 feet, or 4.2 feet above the danger line. The following warning was immediately telegraphed to towns below Columbus:

"Colorado River 4 feet above the danger line at Columbus. Crest of flood will reach Wharton by Sunday (in three days) and Bay City by Tuesday (in five days). Flood stages will continue several days."

The river continued to rise at Columbus until August 1, when a reading of 34.9 feet was recorded. Columbus is the lowest station on the Colorado River, and no record of levels below that point was received.

The rise in the Brazos River at Waco was only a few feet, but many of the streams flowing into it between Waco and Hempstead overflowed the adjacent bottoms. In a few localities the Brazos River itself left its banks, but not generally. The river rose quite rapidly at Hempstead, and the regular observation on August 3 gave a stage of 31.5 feet with rising water. On August 3 the following warning was telegraphed to points below Hempstead:

"Brazos River 32 feet at Hempstead and rising slowly. Flood stages of about 35 feet are now indicated for points below Hempstead. Crest of flood will reach Richmond and Booth about Thursday (August 6)."

The crest of the flood reached Booth on August 4, but practically the same level continued on the morning of the 5th. The highest stage recorded at Booth was 25.3 feet.

While not verified in some details, the warnings were timely and of great value to people having property interests in the river bottoms. The warnings issued for the Brazos River and the streams emptying therein were very favorably commented upon by the press.

A special case, in which the warnings proved of great value, is that of the Brazoria Irrigation Company, with headquarters in Galveston. One of the lifts of this company, located near Richmond, burned down a few days before the high water, and the brick wall next to the river collapsed. The coming flood would cause damage to the amount of several thousand dollars if the wall was not immediately repaired. When the flood warnings were issued the irrigation company chartered a special train, carrying mechanics and material to their plant. The workmen were able to keep the wall above the rising water and no damage resulted.

The highest and lowest water, mean stage, and monthly

range at 174 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, District Forecaster.*

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Service Divison.

The following summaries relating to the general weather and crop conditions during August are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3000 and 14,000, respectively:

Alabama.—Weather during first two decades generally favorable for growth and maturing of crops, except locally excessive and slightly damaging rains in middle and southern counties toward close of second decade; excessively hot weather during early part of last decade caused cotton to wilt and shed badly, and late corn and some minor crops to deteriorate rapidly; last day of month quite cool; rainfall generally deficient in northern and eastern counties.—*F. P. Chaffee.*

Arizona.—The weather was generally very warm, except in the western portion of the Territory; showery conditions prevailed during the greater part of the month, precipitation being above normal in the eastern portion. The supply of irrigation water was generally sufficient for the crops, which all did well and made good progress toward maturity. The ranges were in fine condition and afforded excellent grazing for stock.—*M. E. Blystone.*

Arkansas.—The temperature was about normal, with an excess of precipitation. Cotton made fair progress; it continued fruiting and blooming, but there was some complaint of shedding, rust, and blight; bollworms and sharpshooters made their appearance, but were not general; the crop is still late and promises only a fair yield. An average crop of early corn was assured; the late was fairly promising. Considerable hay and fodder of excellent quality were secured. Sweet potatoes were promising. Late apples are scarce and of inferior quality. At the close of the month all late growing crops were in need of rain, especially late corn—*O. C. Burrows.*

California.—The temperature of the month was slightly below normal, but there were a few days of extremely high temperature, causing trifling injury to fruit and beans. Conditions were generally favorable for drying and maturing the heavy crops of deciduous fruits and grapes. The grain crop was practically all harvested by the close of the month and thrashing and hay baling were in progress. Hops and sugar beets were yielding good crops.—*Alexander G. McAdie.*

Colorado.—Showers materially aided the supply of irrigation water. Harvest of small grain made rapid progress and thrashing was general by the second decade, except in the higher districts. Corn made favorable growth and cutting had begun before the close of the month. Potatoes, sugar beets, and fruits did well, with indications of a large yield of late fruits and potatoes. Most of the second crop of alfalfa was secured and much native hay was stacked in prime condition; ranges were good and stock thrifty.—*Charles E. Linney.*

Florida.—Precipitation was insufficient by reason of unequal distribution. Some local heavy rains damaged cotton and vegetables and delayed haying. The most serious factor during the month was the hot weather during the last week. The hot sun, with intermittent showers, scalded plants and caused squares and leaves to fall. The first half of the month was quite favorable. The last decade was damaging to cotton; picking began during the last decade, becoming brisk during the closing days; the crop will be much below the average. Corn, cane, citrus fruits, pineapples, and minor crops are good.—*A. J. Mitchell.*

Georgia.—During the first three weeks well-distributed showers were of almost daily occurrence and crops of all kinds made favorable progress. An excessively warm and dry week followed, during which vegetation suffered seriously, especially cotton. Under the influence of constant sunshine and high temperature cotton shed and rusted considerably. Picking was becoming general at the close of the month, with prospects unfavorable for an average yield.—*J. B. Marbury.*

Idaho.—Conditions were generally favorable for irrigated crops, though in some localities canals failed to carry sufficient water. Haying, harvesting, and thrashing progressed rapidly. Fruit made satisfactory advance, and shipping was in progress at the close of the month. Ranges suffered somewhat from drought.—*S. M. Blandford.*

Illinois.—Droughty conditions prevailed over a portion of the southern district throughout the month. They were most pronounced in the extreme southern tier of counties, as rainfall in ample quantities occurred over the other portions of the State. Corn was generally in a thrifty condition at the end of the month, although from two to three weeks backward. Oats were harvested and thrashed, mostly under favorablet conditions.—*Wm. G. Burns.*

Indiana.—Precipitation during the month was ample and fairly well distributed. Excepting in the last decade the temperature, particularly at night, was too low for rapid growth of crops. Thrashing wheat and oats completed early in the month, yield light. Corn, which was one to three weeks behind, made slow growth and, except in north section, promised less than average crop. Late potatoes promised fair crop; apple crop light, and fruit falling. Canneries started on tomatoes and sweet corn.—*W. T. Blythe.*

Iowa.—Month cooler than usual, with double the normal rainfall and deficient sunshine. Prevalent humidity and cloudiness during first and last weeks delayed thrashing and other fieldwork, but fair progress was made between the 10th and 24th. Growth of corn was unusually slow, causing much anxiety for the future safety of the crop, on account of its belated condition. Thrashing returns unsatisfactory, except timothy seed. Good progress in fall plowing. Early apple crop good.—*John R. Sage.*

Kansas.—Early corn advanced from roasting ear stage at the first of the month to cutting stage by the end; late corn grew rapidly, advancing through the silking and tasseling to the earing stage, and was well eared before the close of the month. Prairie grass made fine growth and haying was pushed when weather permitted. Cutting of third crop of alfalfa progressing at the end of the month. Fall plowing and thrashing continued. Apples were abundant in the south, and fine ones were being marketed from Shawnee County.—*T. B. Jennings.*

Kentucky.—The temperature during most of the month was too low for best results. The rainfall was very unevenly distributed and drought was severe in some localities. Crops made fair progress, however, over the greater portion of the State. Corn and tobacco were very good in central, southern, and most of the western counties, but badly damaged in northeastern counties. Both crops were being cut rapidly. Hemp was short. Plowing retarded by drought. Wheat acreage reduced.—*H. B. Hersey.*

Louisiana.—Frequent showers during the first decade were unfavorable for cotton. A rapid growth in the plant resulted, but very little fruit was developed. Less rainfall and more sunshine during the second decade caused some improvement, while the weather of the third decade improved the crop in some localities and injured it in others. Ideal weather for the sugar cane crop prevailed throughout the month and a rapid growth resulted. Rice developed rapidly and is very promising. Corn is doing well. Fall truck gardens are being planted.—*I. M. Cline.*

Maryland and Delaware.—The cool, wet, and cloudy weather interfered with farm work and prevented rapid growth or maturity. Corn continued backward, on account of low temperatures and insufficient cultivation. Final harvest of wheat gave light yields, and of oats light to fair returns. Buckwheat grew nicely. Pastures continued good. The late hay harvest was excellent in quality and quantity. Much tobacco was cut and housed; the crop was good, but curing was not satisfactory at all times. Apples were promising. Tomatoes and melons yielded below average. Potatoes were an abundant crop, but the loss by rot was large. Fall plowing made about an average advance.—*Oliver L. Fassig.*

Michigan.—Meadows, pastures, sugar beets, and beans on high land made good progress. Wet weather and cool nights caused slow growth of corn and were detrimental to fruit and to beans and potatoes on low lands. Some oats and peas were damaged by heavy rains. At the close of the month apples continued fairly promising, and corn, although backward, was quite thrifty.—*C. F. Schneider.*

Minnesota.—Several general rains and much showery and cloudy weather during the month. Low temperatures for the season occurred early in the month, again before the middle of the month, and also during the last week. Oat harvest was general and spring wheat harvest was begun in the southern half about the 1st. The cutting of spring wheat, oats, barley, and flax was finished by the 25th, except the late crops, which were still being cut at the end of the month. Stacking and shock thrashing were carried on as rapidly as possible after harvest, but wet weather caused much delay, and toward the end of the month much shocked grain was suffering injury from dampness. In parts of the south the fields were too wet for the movement of binders and thrashers. Corn was backward all the month.—*T. S. Outram.*

Mississippi.—The mean temperature and the average rainfall for the month were slightly above normal. Cotton generally made a good growth and fruited well, although it continued about three weeks late. Rust and shedding were general, but serious only in some of the southern counties. Bolls began to open about the 15th and by the close of the month picking was general in the south. A splendid crop of corn matured nicely. Much hay and fodder were saved in good condition. Minor crops did well. Fall crops were planted and generally came up to good stands.—*W. S. Belden.*

Missouri.—In a few eastern and southern counties corn suffered considerably from drought, but elsewhere there was generally sufficient

moisture, and, although cool nights somewhat retarded the growth of late corn, the crop, as a whole, improved steadily during the month. Cotton also improved considerably; late forage crops generally did well, and pastures continued in good condition, except in portions of the southern sections. Plowing for wheat was considerably retarded by dry weather in the eastern and southern counties.—*A. E. Hackett.*

Montana.—Cool, wet weather delayed harvesting somewhat, but at the end of the month the greater part of the winter grain had been cut, thrashing had commenced, and the spring grain harvest was well advanced; yields ranged from average to very good. The second crop of alfalfa was good, but the yield of hay was considerably below the average, except in some localities in the southwestern counties. Potatoes and other minor crops will give good yields.—*Montrose W. Hayes.*

Nebraska.—Harvesting was about completed during the first half of August, although showery and unfavorable weather prevailed. Thrashing, stacking, and haying were delayed by wet weather, some grain in shock was damaged, and some hay almost ruined by the rain. A large amount of wild or prairie hay was secured in the last half of the month. Grass in pastures and on the ranges was excellent throughout the month. Low temperature was unfavorable for the rapid growth of corn, but it made a healthy, average growth. The heavy rainfall caused the corn to ear heavily, with large, well-filled ears, and to continue green and growing, with but slow progress toward maturity. Rapid progress was made with fall plowing.—*G. A. Loveland.*

Nevada.—A very dry month with about normal temperature. Fine weather throughout the month for harvest work, which progressed without interruption. Good crops of hay and grain were secured in excellent condition. Irrigated crops made fair progress, but pastures and range grass dried up rapidly on account of drought. Water very low and scarce at close of the month. Apple crop very promising.—*J. H. Smith.*

New England.—The weather was exceptionally cool, the mean temperature being the lowest for August of official record. The rainfall was near the average and, with a few exceptions, well distributed. There was a deficiency in sunshine, which, combined with the uniformly low temperature, was unfavorable to crop growth and to harvesting. Frosts in northern sections, near the close of the month, caused some damage to late vegetables and to corn, but generally speaking crops are in good condition, and harvesting progressing favorably.—*J. W. Smith.*

New Jersey.—The month was abnormally cool and wet; very destructive thunderstorms occurred in the northern portion of the State, doing great injury to crops and tree fruits. Truck crops in the southern sections were seriously injured; melons of all kinds, lima beans, and tomatoes suffered the most.—*Edward W. McGann.*

New Mexico.—The month was generally unfavorable for crops and ranges, owing to high temperature and deficient rainfall. In the southwest portion of the Territory torrential rains fell, causing floods and extensive damage to towns, railroads, and crops in the lowlands and valleys. In the mountain districts local showers replenished streams and furnished a fair supply of water for irrigation, but in other portions the deficiency was marked, especially on the prairies and ranges, where the water in wells, springs, and water holes was quite low. At the close of the month, although the month was unfavorable, range stock were still in very fair condition.—*J. B. Sloan.*

New York.—The coolest August in fifteen years; light frosts on the 8th; not a very warm day during the entire month; precipitation very heavy and excessive, causing floods, and damaging oats and barley; wheat, rye, and hay large yields and housed in good condition; buckwheat fine, but badly lodged; tobacco damaged by gales, hail, and floods; large quantity of apples blown from trees; corn nearly a failure; beans damaged by rust; potatoes declined rapidly from blight and rot; plowing well advanced.—*R. G. Allen.*

North Carolina.—During the larger portion of August conditions were highly favorable for the growth of crops, which improved steadily. The rainfall during the first two decades was frequent, but not heavy, except in the eastern district, where some damage resulted from excessive rains, which, however, were confined to the immediate coast. Cotton improved steadily, grew to average size, fruited well, and at the close of the month was opening rapidly, with picking under way. Corn eared well; much fodder was saved. Cutting and curing tobacco continued uninterruptedly, with fairly good results. All minor crops, especially peanuts, rice, sweet potatoes, and field peas, grew well. Fruit, except grapes, was inferior.—*C. F. von Herrmann.*

North Dakota.—The month was unfavorable for maturing and harvesting grain. Cool weather, with heavy and frequent rains, caused a very rapid growth of late sown crops, but at the same time made the ground so wet that it was difficult to get on it with harvesting machinery to care for early sown grain. Considerable hay was damaged and some spoiled by being wet before it could be stacked.—*B. H. Bronson.*

Ohio.—All crops were injured by the dry weather which prevailed until near the close of the month; there were heavy rains in north during the last week, but only light to moderate in central and south. Corn is fairly promising in north, but only a light crop can be expected in central and most south counties. Late potatoes, gardens, tobacco, clover, buckwheat, and apples injured by drought, and plowing for wheat delayed.—*J. Warren Smith.*

Oklahoma and Indian Territories.—Early corn matured and being cut; late corn filling well. Fall plowing well advanced. Cotton made rapid growth, was well bolled, and picking in progress. Wheat and oat harvest completed. Haying continued, with good yields. Third cutting of alfalfa in progress. Millet, broom corn, sweet potatoes, melons, and fruit matured and being gathered and marketed, with fair to good yields. June corn, cane, kaffir corn, castor beans, turnips, and late potatoes in fair to good condition.—*C. M. Strong.*

Oregon.—The weather during the month was generally favorable for cutting and thrashing fall and spring grain, and at the close of the month both of these crops were nearly harvested. Wheat this year is below average in quantity, but the quality is excellent. Oats yielded exceptionally well. Hops were ready to pick by the last of the month; this crop is below average, and there is more mold than common in the yards. Fruit made good advance, except apples, which are quite uneven.—*Edward A. Beals.*

Pennsylvania.—The coldest August on record, and the average precipitation was 35 per cent in excess of the normal. The conditions were generally unfavorable to agricultural interests. Continued low temperature materially retarded the advance of corn and tobacco, and frequent and copious showers delayed haying, harvesting, and plowing, caused rust in oats and rot and blight in potatoes, and seriously injured a large acreage of oats by causing them to sprout after being put in shock.—*H. A. McNally.*

Porto Rico.—The precipitation during the month was considerably above the normal, but well disturbed throughout the month. High winds during the middle of the month caused some damage to fruit trees, coffee, and small crops, but in general the weather was favorable and all crops were in excellent condition at the close of the month. Cane has improved steadily and is now in normal condition. Coffee is maturing slowly and promises a larger and better crop than last year. The experimental cotton crop continues developing satisfactorily. Planting of small crops and cane of gran cultura has been active. Very little tobacco has been sown. Fruits of the season and small crops have been plentiful. Pasturage is abundant and stock is doing well.—*E. C. Thompson.*

South Carolina.—The first twenty days had copious precipitation and even temperatures, conditions exceedingly favorable for crop growth and development, with marked improvement in cotton, corn, rice, and grass for hay, as well as in all minor crops, but the conditions were unfavorable for cultivation of field crops. The last nine days were excessively hot and dry, causing cotton to rust and shed squares and young bolls, and grown bolls to open rapidly, some prematurely. Corn also deteriorated, but minor crops maintained their fine condition to the close of the month. Tobacco curing was finished and rice harvest begun. Cooler weather and numerous showers on the 30th–31st brought relief, and partially checked deterioration.—*J. W. Bauer.*

South Dakota.—Frequent rains somewhat retarded haying and harvesting, stacking and thrashing of wheat, oats, and spelt, and injured some grain in shock; harvest was practically completed in the second decade. Much hay was secured. Corn, though healthy and promising, was backward and made but moderate progress toward maturity; the earliest was glazing by the 31st. Flax did well; considerable early was cut. Potatoes were mostly in good condition; rains caused some rot locally. Wheat yields were variable; oat, spelt, and barley yields generally good.—*S. W. Glenn.*

Tennessee.—Favorable conditions prevailed until near the end of the month, when drought set in over considerable areas, seriously affecting growing and maturing crops. At the end of the month early corn promised fine yields, as a rule, but the late crop was needing rain very badly; cotton, peanuts, and potatoes were showing the bad effects of dry weather; tobacco, which was a good crop, was being housed in fine condition; large quantities of hay had been saved; wheat thrashing, generally with light results, was about finished, while oats proved to be a fairly good crop; apples were barely an average crop.—*H. C. Bate.*

Texas.—Weather conditions, as a rule, were quite favorable for crop development during the month, although the moisture supply was irregularly distributed through the month in some sections. Cotton crop made good progress, fruiting exceptionally well, but by the end of the month insect pests were doing great damage. Cotton began to open latter part of month and some picking was done. Other growing crops did well. Thrashing of wheat, rye, and oats completed with satisfactory results. Rice did well. Hay and forage crops excellent; pasturage abundant; fruits below average; gardens not very good.—*W. H. Alexander.*

Utah.—Abnormally high temperatures prevailed throughout the month excepting from the 26th to the 28th when the weather was unseasonably cool, with considerable frost in the high districts. The harvesting of fall grain was completed and thrashing was well under way. The cutting of spring grain was in progress. The yields of fall grain were below the average, especially on dry farms, while spring grain was fully up to the usual yield. A fair third crop of alfalfa was being harvested. Corn was silking and tasseling, and beets on irrigated soil were making good growth. Potatoes, tomatoes, and fruit of all kinds were marketed, yields being fair. Ranges were poor and irrigation water was scarce.—*R. J. Hyatt.*

Virginia.—While the month was somewhat cooler than usual, with abundant rainfall in those districts east of the Blue Ridge, the progress of outstanding crops was very satisfactory, especially corn and grass.

However, fieldwork was more or less interrupted, and at the close of the month less than the usual amount of fall fallowing had been completed. There was a fine second growth of grass, considerable of which was cut between the 15th and 20th. Tobacco did well, and the apple crop was promising.—*Edward A. Evans.*

Washington.—Although the precipitation was above the average, and that of the eastern section greatly above, yet it occurred mostly within a period of four or five days, so that the greater part of the month was dry and favorable for late haying and the harvesting of grain. Winter wheat thrashing and spring wheat cutting, which generally begun on the 15th, was not interrupted by rain until the 22d, and again on the 25th. Then a rainy spell, in which from one-half an inch to an inch or more of moisture fell throughout the wheat belt, stopped cutting and thrashing, but did no material damage. It was of great benefit to pastures and late vegetables and roots.—*G. N. Salisbury.*

West Virginia.—Harvesting was practically completed during the first two weeks, and hay was secured in good condition with about an average yield, and oats with rather a poor yield. At the close of the month corn, millet, buckwheat, cow peas, and gardens were doing fairly well, but all had suffered considerable injury from the dry weather; potatoes were being dug with a fair yield, and fruit was very scarce, except grapes and apples in some counties.—*E. C. Vose.*

Wisconsin.—The month was a very discouraging, not to say disastrous, one to farmers, on account of the excessive precipitation and the continued cool weather. Much grain cut early in the month with the expectation of thrashing from the shock, did not dry out, and in some localities was a total loss. Corn made but little improvement and at the end of the month was from ten days to two weeks behind the average condition. The wet, cold weather favored the development of potato blight, which became quite general during the last week of the month. Tobacco made very excellent growth, and as the month closed a very large crop was nearing maturity.—*W. M. Wilson.*

Wyoming.—The month was favorable for the harvest of a good crop of native hay, and by the close of the month the third crop of alfalfa had been harvested over the earlier sections and the second crop over practically all of the later sections. Ranges continued good over most of the State, especially the southern half of the State, but grasshoppers were numerous and destructive over some sections of the eastern and northern counties. The water supply of the season was unusually good.—*W. S. Palmer.*

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course this number is much smaller than the total number of stations.

Summary of temperature and precipitation by sections, August, 1903.

Section.	Temperature—in degrees Fahrenheit.							Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.					Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	80.5	+1.0	Lock No. 4, Newbern	101	28	Riverton	53	31	3.57	−1.26	Thomasville	9.62	Tuscumbia	0.16
Arizona	83.5	+0.2	Parker	120	16	Duncan	39	1	1.88	+0.13	Bisbee	6.28	Agua Caliente	T.
			Mohawk Summit	120	29								Yuma	T.
Arkansas	78.7	−0.4	Spielerville	103	4	Lutherville	47	31	4.56	+1.49	Amity	11.03	Brinkley	0.95
California	72.6	−1.1	Imperial	124	16	Bodie	16	15	0.02	−0.04	Crescent City	0.92	Many stations	0.00
Colorado	66.7	−0.8	Blaine	105	5	4 stations	27	5 days.	1.46	−0.16	Holyoke	5.50	Grand Junction	0.02
Florida	82.4	+1.0	Middleburg	102	25	Wewahitchka	63	26	6.84	−0.84	Johnstown	14.79	Jupiter	2.47
			Macclenny	102	28									
Georgia	80.7	+1.7	Douglas	104	25	Diamond	56	31	5.56	−0.38	Valona	13.85	Newnan	1.26
			West Point	104	27									
Idaho	66.2	.....	Lewiston	108	18	Chesterfield	25	28	0.80	.....	Murray	2.07	Blue Lakes	T.
Illinois	72.6	−1.3	New Burnside	102	24	Winnebago	40	7	4.54	+1.44	Kishwaukee	9.29	Cairo	0.81
Indiana	72.0	−1.1	3 stations	100	24	Valparaiso	43	1	3.85	+0.62	Mount Vernon	7.17	Greensburg	1.92
						Auburn	43	3						
Iowa	69.1	−3.1	Logan	101	24	Ogden	41	31	6.64	+3.43	Woodburn	17.74	Toledo	2.55
Kansas	75.3	−1.9	3 stations	105	5, 6	Achilles	39	29	5.19	+2.07	Topeka	12.69	Wallace	0.73
Kentucky	75.5	−0.5	3 stations	100	4, 24	Fords Ferry	49	31	3.27	−0.56	Loretto	6.01	Blandville	0.66
Louisiana	81.7	−0.4	Libertyhill	101	9	Collinston	56	31	4.71	−0.74	Houma	11.12	Rayne	1.80
Maryland and Delaware	71.0	−2.9	3 stations	100	25	Deer Park, Md	37	21	5.26	+1.52	Bachmans Val'y, Md	8.34	Boettcherville, Md	3.18
Michigan	63.1	−3.3	Berrien Springs	95	24	Baraga	31	8	4.72	+2.39	Alma	7.84	Charlevoix	0.51
Minnesota	63.6	−3.6	Currie	94	22	Tower	29	15	4.65	+1.20	Grand Meadow	8.33	Wyoming	2.14
Mississippi	80.6	+0.6	Okolona	101	2, 3	Duck Hill, Ripley	53	31	4.50	+0.17	Natchez	8.05	Macon	1.07
Missouri	74.5	−1.4	Marbiehill	102	24	Edwards, Montreal	43	31	5.40	+2.18	Maryville	11.63	Marblehill	1.17
Montana	64.2	−1.5	Billings	105	19	3 stations	30	5 days.	1.47	+0.54	Ridgelawn	3.62	Parrot	0.08
Nebraska	70.5	−2.4	3 stations	100	4, 21	Agate	35	24	5.05	+2.33	Omaha	12.50	Agate	1.11
Nevada	69.4	−0.1	Rioville	114	29	Potts	28	25	0.10	−0.44	Palmetto	1.32	15 stations	0.00
New England*	61.8	−5.3	Norfolk, Mass	90	23	Patten, Me	29	28, 29	4.09	−0.11	Norwalk, Conn	10.05	Bar Harbor, Me	0.75
New Jersey	68.4	−4.3	Bridgeton	98	25	Charlotteburg, Layton.	39	8	6.95	+2.38	Newark	14.54	Clayton	4.30
New Mexico	71.5	+0.6	Alamogordo, San Marcial.	108	1	Winsors	31	28	1.99	−0.72	Luna	5.60	Albuquerque	0.00
New York	62.4	−4.7	Elmira	92	25	Paul Smiths	30	6	6.10	+2.24	Wappingers Falls	11.87	Harkness	2.51
						Axton	30	8						
North Carolina	76.7	+0.6	Selma	102	25	Linville	45	21	5.26	−0.59	Wilmington	14.35	Southern Pines	2.28
North Dakota	63.7	−1.8	Minot	103	16	4 stations	35	10, 11	4.90	+3.20	Grafton	6.75	Churchs Ferry	2.74
Ohio	70.7	−0.8	Thurman	101	24	Oberlin	38	8	3.20	+0.40	Colebrook	9.33	Plattsburg	0.33
Oklahoma and Indian Territories.	80.5	−0.7	Taloga, Okla	108	27	Jefferson, Okla	40	10	2.72	−1.21	Tahlequah, Ind. T	7.06	Grand, Okla	0.33
Oregon	65.0	−1.0	Coyote	109	18	Deschutes	28	3	0.86	+0.20	Doraville	2.31	Detroit	0.09
Pennsylvania	67.2	−2.9	California	99	25	Dushore	34	8	5.29	+1.59	Saegerstown	8.05	Lock No. 4	2.00
Porto Rico	79.4	.....	San German	100	1	Cidra	53	17	9.06	.....	Morovis	19.40	Isabela	3.79
South Carolina	80.6	+1.2	Gaffney	105	25	Seivern	60	22	7.15	+1.35	St. Stephens	12.83	Clarks Hill	3.05
South Dakota	68.3	−2.1	Pedro	110	4	3 stations	38	9-10	3.48	+1.04	Leola	7.58	Hotch City	1.04
Tennessee	77.2	+0.7	4 stations	99	24-28	Hohenwald	45	31	3.27	−0.54	Greeneville	7.53	Dyersburg	0.48
Texas	82.1	−0.5	Bonham	110	5	Rhineland	54	9	2.18	+0.22	Port Lavaca	17.69	Hondo City	0.17
			College station	110	17	Fort Davis	54	21						
Utah	71.8	+1.4	St. George	110	6	Woodruff	27	28	0.38	−0.41	Lund	2.70	5 stations	0.00
Virginia	73.6	−1.1	Newport News	105	25	McDowell	40	14	4.76	+0.69	Wilkersons	9.39	Bristol	1.55
Washington	64.7	−1.2	Zindel	109	18	Wilbur	33	20	1.11	+0.34	Cheney	3.30	Silvana	0.02
West Virginia	71.4	−0.2	Green Sulphur Spr'gs	105	25	Bayard	38	21	2.64	−1.00	New Cumberland	5.92	Pt. Pleasant	0.99
Wisconsin	64.0	−4.0	Grand Rapids	94	21	Tomahawk	32	10	6.51	+3.74	Grand River Locks	10.79	Manitowoc	4.24
						Prentice	32	12						
Wyoming	65.0	0.0	Thermopolis	106	23	South Pass City	20	28	1.01	+0.12	Moorcroft	4.11	Basin, South Pass City.	T.

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

SPECIAL CONTRIBUTIONS.

THE PERIODICITY OF SUN SPOTS AND THE VARIATIONS OF THE MEAN ANNUAL TEMPERATURES OF THE ATMOSPHERE.

Note by M. CHARLES NORDMANN presented by M. H. POINCARÉ, translated from the Comptes Rendus. Paris, June, 1903. Tome 136, page 1047.

Since the well-known memoir by Koeppen,[1] which appeared in 1873, and which embraces the period from 1830 to 1870, no complete work on this subject has been published.

By the kind advice of Mons. H. Poincaré I have attempted to study the data for the past thirty years bearing on this question which is of such great importance to celestial phyiscs and meteorology. It results from Koeppen's work that the curve of the variations of mean annual temperatures pursues a regular course only at the tropical stations, and that for regions outside of the Tropics, this curve becomes so very irregular that it is no longer possible to recognize in it any periodic course whatever.

I have, therefore, only made use of the results at tropical stations. But as it is especially during these last thirty years that meteorological observations have been everywhere diffused and systematized, I have been able to utilize much more extensive and more accurate materials than Koeppen had at his disposal. For example, whereas, on the one hand, Koeppen only had access to observations from the Indies, the Antilles, and tropical America, I have been able to utilize those for a great number of stations distributed all around the globe, so that the results obtained can really be considered as representing the average condition of all that part of the earth situated between the Tropics; on the other hand, I have had at my disposal a series of observations generally longer for each station than those possessed by Koeppen, so that, whereas, he was obliged to make use of certain series containing only six years of observation (which might be a source of error) I was able to eliminate all series not having at least eleven years of observation, that is to say the mean value of a complete period of sun spots.

The stations, for which I have utilized all the observations published since 1870, are the following, in the order of increasing east longitude:

Havana, Cuba, north, 23°; west, 82°.
Kingston, Jamaica, north, 18°; west, 76°.
Port au Prince, Hayti, north, 18°; west, 72°.
Port of Spain, Trinidad, north, 11°; west 62°.
Pernambuco, Brazil, south, 8°; west, 35°.
Free Town, Sierra Leone, north, 8°; west, 13°.
Port Louis, Mauritius, south, 20°; east, 57°.
Rodriguez Island, south, 19°; east, 63°.
Bombay, India, north, 19°; east, 73°.
Batavia, Java, south, 6°; east, 107°.
Hongkong, China, north, 22°; east, 114°.
Zi-Ka-Wei, China, north, 31°; east, 121°.
Manila, Philippines, north, 11; east, 121°.

The following table summarizes the results obtained. Column A contains, for each year, the general mean of the annual deviations from the normal, and for all the stations; this series of means has been computed by giving the weight 2 to the observations at Bombay, Batavia, Zi-Ka-Wei, Hongkong, and Manila, whose means result from a great number of daily observations and extend over a greater number of years than those of the other stations; to these latter the weight 1 has been given. The figures in column B (calculated in order to give a more homogeneous appearance to the curve of the variations and to eliminate, as far as possible, the secondary irregularities from this curve), are computed in the following manner: Each figure of this column is equal to the mean of the corresponding number in column A and to the half sum of the figure which precedes and the figure which follows it. The column of sun spots contains opposite each year the relative numbers of spots (Wolf's numbers). The numbers in columns A and B represent hundredths of degrees centigrade:

Years.	A.	B.	Sun spots.
	°	°	
1870	−29	−22 min.	139 max.
1871	− 9	−14	111
1872	− 8	− 7	101
1873	− 4	− 9	66
1874	−22	−13	44
1875	− 6	−12	17
1876	−13	− 5	21
1877	+13	− 8	22
1878	+20	+13	3 min.
1879	0	+ 6	6
1880	+ 5	+11	32
1881	+33	+20 max.	54
1882	+ 3	+ 7	59
1883	− 9	−10	64 max.
1884	−27	−21 min.	63
1885	−20	−21	52
1886	−16	−17	25
1887	−16	− 5	13
1888	+26	+13	7
1889	+18	+15 max.	6 min.
1890	− 1	+ 6	7
1891	+10	+ 4	35
1892	− 1	− 5	73
1893	−27	−12 min.	84 max.
1894	+ 2	− 5	78
1895	+ 1	+ 7	64
1896	+25	+20	41
1897	+28	+25	26
1898	+19	+19	26
1899	+10	+18	12
1900	+33	+25 max.	9 min.

If we construct a curve by taking for abscisas the years and for ordinates the numbers in column B, and another curve by taking the same abscissas and as ordinates the numbers of the column Sun spots, but entering these latter ordinates negatively in such a way as to represent the inverse [strictly the complement] of the frequency of the sun spots, we obtain two curves of a perfectly parallel course. A more detailed discussion of the two curves only confirms their parallelism, which appears even in the most minute details; the limits of this note do not permit giving this detailed study here, but it will shortly appear in a memoir containing the details of this work.

We can, however, even now enunciate the following conclusion which results immediately from the examination of the preceding table.

The mean temperature of the earth is subject to a period substantially equal to that of the sun spots; the effect of these spots is to diminish the mean temperature of the earth; that is to say, the curve which represents the variations of the latter is parallel to the inverted curve of the frequency of the sun spots.

I take pleasure in expressing my profound gratitude to Monsieur Mascart who has kindly placed the resources of the Library of the Central Meteorological Bureau at my disposal for this investigation, and to Monsieur Angot who, with a kindness which I am happy to acknowledge, has given me the benefit of his advice, which is of much weight in these matter.

[1] Zeitschrift der Oesterr. Gesellschaft für Meteorologie, t. VIII, 1873.

ON THE SIMULTANEOUS VARIATIONS OF SUN SPOTS AND OF TERRESTRIAL ATMOSPHERIC TEMPERATURES.[1]

By Prof. ALFRED ANGOT, translated by Miss R. A. EDWARDS.

Mr. Charles Nordmann has recently published the general conclusions of a very interesting work in which, confirming and extending the results set forth by Koeppen thirty years ago, he shows the relation between the period of sun spots and the average annual temperature of the earth's atmosphere in the tropical regions.

To obtain this result Nordmann, as did Koeppen, took a cer-

[1] Annuaire de la Société Météorologique de France, June, 1903, pp. 93–97.

tain number of stations furnishing series of temperature observations for at least twelve years. For each station he took the general average and subtracted this average from the value corresponding to each year, which gave the departure of the year from the average. He then averaged the departures found for the different stations for the same year, giving a double weight to stations which afforded the longest series.

It seems to me that the departures thus obtained have no definite significance; it is very difficult, at any rate, to determine the degree of relation that they bear to each other. The average temperature of every station depends on the number of years employed; consequently the absolute values of the departures depend on the length of the series. Should there be, in the course of the same series, some modification of the observations resulting in lack of homogeneity, this defect would affect the general average and consequently all the departures.

Finally, the average of the departures for any given year (in Nordmann's column A) is not based on the same stations from one end of the series to the other.

Under these conditions, it appears to me that it would be advantageous to employ an altogether different method of discussion, in which the observations for each station are treated separately and by separate periods, corresponding nearly to those of the sun spots.

If the observations present some lack of homogeneity that can not be corrected, this defect will affect, at least, the results of one period only, namely, that in which the discontinuity occurs in the observations.

If, for a given station, the average annual temperatures (t) present a variation parallel to that of the number (r) of sun spots (the so-called relative number of Wolf), one can approximately express the relation by the formula

$$t = t_0 + a\,r, \tag{1}$$

(t_0) and (a) being two constants characteristic of each station and of each period of solar activity. Each year will furnish an analogous equation, so that a cycle of sun spots will give eleven equations, which will permit the determination of the most probable values of (t_0) and of (a). It is not necessary, however, that the cycle be absolutely complete; nine or ten years will be sufficient, providing they comprise the greatest and the least values of (r).

The most convenient and the most rapid process for solving the system of equations (1) is that of Cauchy.[2] We commence by adding the (n) equations; dividing the sum by (n), we obtain an equation of the form:

$$T = t + a\,R, \tag{2}$$

$$\text{in which } T = \frac{\Sigma t}{n} \quad R = \frac{\Sigma r}{n}.$$

We now subtract equation (1) from equation (2), or inversely, and obtain a number (n) of equations of the form:

$$a\,(r - R) = (t - T), \tag{3}$$

which we so arrange that the coefficient of (a) shall be always positive. The sum of these (n) equations, or

$$a\,\Sigma\,(r - R) = \Sigma\,(t - T),$$

gives the value of (a) in the most convenient manner possible. As an example of the method, I will here give the calculations relative to the ten years of observations (1892–1901) obtained at Camp Jacob (Guadeloupe). In the first series of equations the coefficient of (a) is the relative number (r) of sun spots, and the second member is the annual observed temperature (t), expressed in centigrade degrees. The second series of equations represents the equations (3) obtained by subtracting each of the first ten equations from their average.

[2] This is, of course, not equivalent to the solution by the method of least squares.—ED.

			C.	Departures.
		°C.	°C.	°C.
1892	$t_0 + 73\,a =$	21.52	$31.1\,a = -0.275$	$21.51 + 0.01$
1893	$t_0 + 85\,a =$	21.41	$43.1\,a = -0.385$	$21.40 + 0.01$
1894	$t_0 + 78\,a =$	21.40	$36.1\,a = -0.395$	$21.47 - 0.01$
1895	$t_0 + 64\,a =$	21.63	$22.1\,a = -0.165$	$21.59 + 0.04$
1896	$t_0 + 42\,a =$	21.83	$0.1\,a = +0.035$	$21.79 + 0.04$
1897	$t_0 + 26\,a =$	22.02	$15.9\,a = -0.225$	$21.94 + 0.08$
1898	$t_0 + 27\,a =$	21.82	$14.9\,a = -0.025$	$21.93 - 0.11$
1899	$t_0 + 12\,a =$	21.89	$29.9\,a = -0.095$	$22.06 - 0.17$
1900	$t_0 + 9\,a =$	22.19	$32.9\,a = -0.395$	$22.09 + 0.10$
1901	$t_0 + 3\,a =$	22.24	$38.9\,a = -0.445$	$22.14 + 0.10$
Sum of 10 years	$t_0 + 419\,a =$	217.95	$263.0\,a = -2.370$	
Average	$t_0 + 41.9\,a =$	21.795	$a = -0.00901.$	

Substituting this value of (a) in the equation $t_0 + 41.9\,a = 21.795°$, we obtain $t_0 = 22.17°$.

If we calculate the temperature for each year by means of the formula $t_0 + ar$, we obtain the numbers given in column C in this table. Beside each of these numbers, we find the departures (obs. — calc.) between the temperatures as observed and as calculated.

The probable error of an observation calculated from the departures from the general average is ± 0.20° C.; it falls to ± 0.06° C. if we calculate it from the departures given in the last column of the table. It would seem then, according to these values, that the relation of the average temperatures to the sun spots at Camp Jacob is very clear. In addition, we notice that the value found for the coefficient (a) corresponds to a change of temperature of 0.90° C. (more than four times greater than the probable error of an observation) between the two years for which the difference between the relative number of sun spots is equal to 100, a difference which is sometimes exceeded when we compare years of maximum and minimum of sun spots.

In spite of this apparently favorable result, we should not conclude, from these observations alone, that the relation in question between temperature and sun spots actually exists; it is necessary to repeat the same calculation for a great number of stations and for many cycles of solar activity. Certain of these cycles will give a result favorable to the hypothesis, i. e., a negative value of the coefficient (a), others will give an unfavorable result; the ratio of the numbers of these two classes of cases will permit one to form an idea of the degree of probability as well as of the real size of the coefficient (a). I will not undertake here to discuss the question in a general manner. I will give only the results of some series that I have calculated, indicating for each series and each cycle the resulting equation for $a\,\Sigma\,(r - R) = \Sigma\,(t - T)$, which will give the value of (a).

Hongkong.—Two series of observations were obtained under different conditions, the one from 1865 to 1886 (1885 is missing) made by the military surgeons, and the other from 1884 to the present time, carried on at the observatory. These two series have been treated separately and divided each into two parts, ten years for the first series and nine for the second. The following are the resulting equations which give (a) for each of these four periods:

	°C.
1865–1874	$356\,a = -0.50$
1875–1886	$232\,a = -3.80$
1884–1892	$198\,a = -1.04$
1893–1901	$230\,a = -1.17$
	$1016\,a = -6.51$, whence $a = -0.0064°$ C.

The four periods considered are all favorable to the hypothesis of the relation between sun spots and temperatures.

Batavia.—The observations made at the observatory from 1866 to 1899 were divided into three periods, the first two of eleven years, the last of twelve; the resulting equations which give (a) are the following:

	°C.
1866–1876	$416\,a = -0.47$
1877–1887	$283\,a = -0.70$
1893–1899	$298\,a = -1.11$

$952\,a = -2.28$, whence $a = -0.0024°$ C.

The three periods are again all favorable to the hypothesis, but the coefficient obtained is much smaller than for Hongkong.

Bombay.—The observations, made from 1846 to 1899, were divided into five periods, of which the first four comprise eleven years and the last ten years only. The equations which give (a) are the following:

	°C.
1846–1856	$330\,a = -2.37$
1857–1867	$263\,a = +1.23$
1868–1878	$423\,a = -0.10$
1879–1889	$240\,a = -0.47$
1890–1899	$240\,a = -1.02$

$1496\,a = -2.73$, whence $a = -0.0018°$ C.

Of the five periods considered one is clearly unfavorable to the hypothesis; one gives scarcely any variation, and the other three are favorable.

Barbados.—Observations were made from 1865 to 1886, but as the two years 1881 and 1882 were missing, there remained then exactly twenty years which have been divided into two equal periods. The equations which give (a) are the following:

	°C.
1865–1874	$356\,a = -0.11$
1875–1886	$195\,a = +0.69$

$551\,a = +0.58$, whence $a = +0.0011°$ C.

The first series is favorable to the hypothesis, the second unfavorable.

Havana.—Sixteen years of observations (1886–1901); using the years 1892–1895 twice, the two series are 1886–1895 and 1892–1901. The equations obtained for (a) are the following:

	°C.
1886–1895	$285\,a = -0.72$
1892–1901	$270\,a = -0.38$

$555\,a = -1.10$, whence $a = -0.0020°$ C.

In summing up we find that of the 16 series thus studied, 14 give for (a) a negative value, 2 a positive value; the probability is then, according to these observations, 7 to 1 that an increase in the number of sun spots is accompanied by a diminution in the temperature and inversely.

By giving to the values of (a) deduced from observations of the various stations, weights proportional to the number of series, we obtain for a final value $a = -0.0033°$ C.

Hence, an increase of 100 in Wolf's relative sun-spot numbers (a difference which frequently exists between a maximum and a minimum) will be accompanied by a diminution of 0.33° C. in the value of the mean annual temperature.

It is evident that in order to determine the value of the coefficient (a) it would be necessary to work with a much larger number of series. I have given the numbers which precede only as an example of a method which appears to me more exact and more convincing than that ordinarily employed.

CLIMATOLOGY OF COSTA RICA.

Communicated by Mr. H. PITTIER, Director, Physical Geographic Institute.

[For tables see the last page of this REVIEW preceding the charts.]

Notes on the weather.—On the Pacific slope the rains were generally above the normal. In San José pressure and relative humidity were slightly above the average, while temperature was below. Sunshine 168 hours, against a normal of 134. On the Atlantic slope rains were also very abundant, excepting in the valleys of the interior, where there was a relative scarcity. A few local cyclonic movements did some damage to the banana plantations.

Notes on earthquakes.—August 8, $2^h\ 29^m$ a. m., slight shock, E–W, intensity II, duration 3 seconds. August 19, $1^h\ 02^m\ 50^s$ a. m., strong shock, WNW–ESE, intensity III, duration 3 seconds.

RECENT PAPERS BEARING ON METEOROLOGY.

Dr. W. F. R. PHILLIPS, Librarian, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——.

Science. New York. N. S. Vol. 18.

Shedd, John C. Concerning the word Barometer. Pp. 279–280.

Ward, R. DeC. March Weather Proverbs. [Review of article of B. C. Webber.] P. 314.

Ward, R. DeC. Height of the Sea Breeze. [Note.] P. 314.

Ward, R. DeC. Storms of the Great Lakes. [Note on bulletin of E. B. Garriott.] Pp. 314–315.

Scientific American. New York. Vol. 89.

Talbot, Frederick A. The Spencer Airship for 1903. Pp. 169–170.

—— Experiments with motor-driven Aeroplanes. P. 204.

Guarini, Émile. The Seas of Fog. P. 207.

Scientific American Supplement. New York. Vol. 56.

Pressey, H. A. Methods of measuring velocity in river channels. Pp. 23140–23142.

Nature. London. Vol. 68.

—— Graham Bell's Tetrahedral Cell Kites. Pp. 347–349.

Ramsay, William and Soddy, Frederick. Experiments in Radio-Activity, and the Production of Helium from Radium. Pp. 354–355.

Strutt, R. J. On the Intensely Penetrating Rays of Radium. Pp. 355–356.

Geikie, Arch[ibald.] Summer Lightning. P. 367–368.

Wimperis, H. E. A Mirage at Putney. P. 368.

MacDowall, Alex. B. Sun Spots and Phenology. Pp. 389–390.

Walker, Alfred O. Peculiar Clouds. P. 416.

—— The International Study of the Sea. Pp. 417–418.

Proceedings of the Royal Society. London. Vol. 72.

Ramsay, William. Experiments in Radioactivity and the Production of Helium from Radium. Pp. 204–207.

Strutt, [R. J.] On the Intensely Penetrating Rays of Radium. Pp. 208–210.

Aitken, J. On the Formation of Definite Figures by the Deposition of Dust. [Abstract.] P. 211.

Symons's Meteorological Magazine. London. Vol. 38.

—— Heavy Falls of Rain in July, 1903. Pp. 113–114.

—— Abraham Follet Osler. P. 118.

—— Heavy Falls of Rain in short periods. Pp. 119–120.

Terrestrial Magnetism and Atmospheric Electricity. Baltimore. Vol. 8.

Pegram, G. B. On the Radio-Activity of Ground Air. [Review of article of J. Elster and H. Geitel.] P. 83.

Pegram, G. B. The Concentration of Radio-active Emanations in Liquid Air. [Review of article of H. Ebert.] Pp. 83–85.

Schultz, L. G. Messungen der Electricitätszerstreuung in der freien Luft. [Abstract of paper of J. Elster and H. Geitel.] Pp. 85–86.

Schultz, L. G. Étude de l'électricité atmosphérique au sommet du Mont Blanc, (4810 m.) par beau température. [Review of article of G. Le Cadet.] Pp. 86–87.

Schultz, L. G. Ueber Elektricitätszerstreuung bei nebeligem Wetter. [Review of article of A. Gockel.] Pp. 87–88.

American Society of Civil Engineers. New York. Vol. 29.

Johnson, Francis Robert. South African Irrigation. [Contains meteorological data.] Pp. 589–614.

Harrod, B. M.; Brown, L. W.; Ockerson, J. A.; Haupt, Lewis M. The Levee Theory on the Mississippi River. Pp. 690–739.

London, Edinburgh, and Dublin Philosophical Magazine. London. 6th Series. Vol. 6.

Petterson, J. On the Ionization in Air at different Temperatures and Pressures. Pp. 231–238.

Wilson, H. A. The Ionization produced by Hot Platinum in Air. Pp. 267–268.

Knowledge. London. Vol. 26.

Field, K. D. Curious Sunset Phenomena. Pp. 206–207.

Philosophical Transactions of the Royal Society of London. London. Vol. 201.

Aitken, John. On the Formation of Definite Figures by the Deposition of Dust. Pp. 551–558.

Engineering News. New York. Vol. 50.

—— The Kansas City Flood of 1903. Pp. 233–236.

Journal of Geography. Chicago. Vol. 2.

—— The Value of Weather Forecasts. P. 384.

Journal of the Western Society of Engineers. Chicago. Vol. 8.

Wright, Wilbur. Experiments and observations on Soaring Flight. Pp. 400–417.

Ciel et Terre. Bruxelles. 24me année.

—— Les taches solaires et les perturbations magnétiques. [Review of article of P. Sidgreaves.] Pp. 285–286.

—— L'électricité atmosphérique expliquée par la théorie des électrons. [Review of article of Ebert.] Pp. 286–287.

—— Exploration de la haute atmosphère sur les océans. [Review of article of Berson.] Pp. 287–288.

—— Les mistpoeffers Italiens. [Abstract of article of Alippi.] Pp. 288–289.

—— Les sécheresse aux Indes. [Abstract of article of Eliot.] Pp. 289–290.

—— L'influence des montagnes sur la grêle. [Abstract of article of V. Monti.] P. 290.

—— La température de la période glaciaire. [Note on memoir of Paul and Fritz Sarasin.] P. 291.

—— Le tracé des courbes climatologiques. [Note on article of W. von Bezold.] P. 291.

—— Distribution particulière de la température dans les couches très élevées de l'atmosphère. [Abstract of article of L. Teisserenc de Bort.] P. 292.

—— Éclipse totale de soleil en 1905. P. 292.

Prinz, W. Analyse microscopique d'une poussière tombée à Ténériffe les 18–21 février 1903. Pp. 293–300.

—— Recherche des endroits propices à l'établissement d'observatoires. Pp. 314–315.

—— Le climat de l'île de Chypre. [Review of article of Bellamy.] Pp. 315–316.

—— Tempêtes de poussière en Australie. P. 316.

La Géographie. Paris. Vol. 7.

Rabot, Charles. Diminution de la nappe phréatique en Angleterre. Pp. 376–377.

Paquier, J. B. Distribution géographique des forces hydrauliques dans le département de l'Orne et les départements voisins. Pp. 427–442.

Comptes Rendus de l'Académie des Sciences. Paris. Tome 137.

Forel, F. A. Le cercle de Bishop, couronne solaire de 1903. Pp. 380–382.

Violle, J. Sur le phénomène aérodynamique produit par le tir des canons grêlifuges. Pp. 397–398.

Guillaume, J. Observations du soleil faites à l'observatoire de Lyon pendant le deuxième trimestre de 1903. Pp. 431–432.

L'Aérophile. Paris. 11me année.

Baume-Pluvinel, A. de la. L'analyse spectrale automatique dans un ballon-sonde. Pp. 159–162.

Gaea. Leipzig. 39 Jahrgang.

—— Die gegenwärtige Entwickelung der Luftschiffahrt. Pp. 560–565.

—— Der Einfluss der Mondphasen auf den Regen. Pp. 568–569.

—— Sonnenscheindauer in Deutschland. Pp. 570–571.

—— Ueber Elektrizitätszerstreuung in der Atmosphäre. [Abstract of article of P. Czermak.] P. 628.

—— Ueber die geographischen und klimatischen Verhältnisse der Länder, welche die Bagdadbahn durchschneiden wird. [Abstract of article of Paul Rohrbach.] Pp. 628–629.

—— Die Regenverhältnisse Palästinas. Pp. 630–631.

Annalen der Hydrographie und Maritimen Meteorologie. Berlin. 31 Jahrgang.

Prager, M. Zur Meteorologie der Gilbert-Inseln mit einem Anhang über die Inseln und die Bevölkerung. Pp. 348–354.

Messerschmitt, J. B. Neuerungen an Marinebarometern, veranlasst durch Schweremessungen auf See. Pp. 359–362.

—— Temperatur des Meerwassers zu Tsingtau. Oktober 1901 bis September 1902. P. 369.

—— Wetter und Sturmsignale für die ostasiatischen Gewässer. Pp. 379–384.

Prager, M. Zur Meteorologie der Gilbert Inseln mit einem Anhang über die Inseln und die Bevölkerung. Pp. 388–395.

Maurer, H. Die Witterung zu Tsingtau im Dezember 1902, Januar und Februar 1903, nebst einer Zusammenstellung für den Winter 1902–1903. Pp. 395–397.

Das Wetter. Berlin. 20 Jahrgang.

Ziegra, Alfred. Untersuchung der "Nachtfrostprognose nach Kammermann" für mehrere meteorologische Stationen Nord- und Mitteldeutschlands. Pp. 177–181.

Grundmann, G. Wolkentrombe. Pp. 191–192.

Robitzsch, Max. Blitzschlag in Hörter. P. 192.

Zeitschrift für Gewässerkunde. Leipzig. 5 Band.

Gravelius, H. Der Einfluss der Gletscher auf den Wasserhaushalt der Alpenflüsse. Pp. 321–340.

Oppokow, E. Zur Frage der vieljährigen Abflusschwankungen in den Bassinsgrosser Flüsse, in Zusammenhang mit dem Gang der meteorologischen Elemente. Pp. 340–365.

Mitteilungen von Forschungsreisenden und Gelehrten aus den Deutschen Schutzgebieten. Berlin. Band 16.

—— Ergebnisse der meteorologischen Beobachtungen in Kpeme. Pp. 147–148.

—— Ergebnisse von Regenmessungen in Togo im Jahre 1902. Pp. 148–149.

Kohlschütter, E. Barometerbeobachtungen in Langenburg am Nyassa. Pp. 201–204.

Illustrirte Aeronautische Mittheilungen. Strassburg. 7 Jahrgang.

Leher, Max. Joseph Maximilian Freiherr v. Lütgendorf, der erste deutsche Luftschiffer. Pp. 281–306.

Linke, F. Eine wissenschaftliche Ballonfahrt von Göttingen aus. Pp. 306–308.

—— Internationale aëronautische Kommission für wissenschaftliche Luftschiffahrt. Pp. 308–310.

Petermanns Mitteilungen. Gotha. Band 49.

Greim, G. Der meteorologische Beobachtungsdienst im Grossherzogtum Hessen. P. 143.

Hann, J. Bemerkungen über die Schwerekorrektion bei den barometrischen Höhenmessungen. Pp. 163–166.

Physikalische Zeitschrift. Leipzig. 4 Jahrgang.

Gockel, A. Ueber die Emanation der Bodenluft. Pp. 604–605.

Stark, J. Der Glimmstrom bei atmosphärischem Druck. Pp. 605–608.

Wiener Luftschiffer-Zeitung. Wien. 2 Jahrgang.

Valentin, J. Die Hochfahrt auf 7280 meter. Pp. 164–167.

Das Weltall. Berlin. 3 Jahrg.

Sieberg, Aug. Ueber ringförmige Gebilde um Sonne und Mond, sowie verwandte atmosphärischoptische Erscheinungen. Pp. 284–289.

Meteorologische Zeitschrift. Wien. Band 20.

Kossatsch, M. Die Lage der Troglinie in einer elliptischen Zyklone. Pp. 337–341.

Szalay, L. von. Ueber Blitzphotographien. Pp. 341–347.

Hann, J. Die meteorologischen Ergebnisse der Expedition Sr. M. Schiff "Pola" in das Rote Meer 1895–96 und 1897–98. Pp. 347–360.

—— Physiologische Wirkung verdünnter Luft. Pp. 360–361.

Papezik, J. Wolkenschlauch. P. 361.

—— Vorläufiger Bericht über die internationalen Aufstiege vom 7. Mai 1903. Pp. 362–363.

—— Vorläufiger Bericht über die internationale Aufstiege vom 4. Juni 1903. Pp. 363–364.

Weyde, F. Die Abhängigkeit des Grundwasserstandes von dem Luftdrucke, dessen Steigen und Fallen während eines Tages (Flut und Ebbe). Pp. 364–367.

—— Charles Nordmann über die magnetischen Eigenschaften der Erdatmosphäre. Pp. 367–368.

—— Resultate der meteorologischen Beobachtungen zu Manaos am Amazonenstrom im Jahre 1898. P. 368.

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Philippson, A. Eisbildung auf der Bucht von Salonik im letzten Winter. Pp. 369–370.

Hann, J. Meteorologische Beobachtungen an der Küste von Spitzbergen, Sommer 1898. Pp. 370–371.

—— Meteorologische Beobachtungen auf der Bären-Insel, Sommer 1899. P. 371.

Exner, F. M. S. P. Langley: Die Solarkonstante und verwandte Probleme. Pp. 372–373.

—— Richard Assmann über die am æronautischen Observatorium beobachteten Temperaturumkehrungen. Pp. 373–375.

Schwab, P. Franz. Ueber das photochemische Klima von Kremmünster. Pp. 375–377.

Drapczynski, —. Verteilung der meteorologischen Elemente, etc. P. 377.

—— Aussergewöhnliche Dämmerungen. P. 377.

—— Das Gewitter vom Sonntag, den 19. Juli. Pp. 377–378.

—— Temperatur-Extreme im Innern von Chile. Pp. 378–379.

Behn, U. Ueber Photographien von Perlschnurblitzen. Pp. 379–380.

Okada, T. Vergleichende Messungen der Verdunstung des Meerwassers und des Süsswassers. Pp. 380–384.

—— Meteorologische Beobachtungen auf Bermuda 1899 und 1900. P. 384.

Boletin Mensual del Observatorio Meteorológico del Colegio pio de Villa Colón. Montevideo. Año 15.

Bertelli, Timoteo. Génesis del calor terrestre, sobre su pasaje al estado actual y sobre algunos fenómenos que de él dependen. Pp. 5–12.

Boletin del Instituto Cientifico y Literario "Porfirio Diaz." Toluca. Tomo 6.
Camacho, Anselmo. Puede aplicarse el planimetro en los observatorios meteorológicos á la determinación de las medias diarias y mensuales? Pp. 135–141.
Boletin Agricola. Arequipa. Tomo 2.
M., M. V. El año meteorológico 1901–1902. Pp. 4–9.
Hemel en Dampkring. Amsterdam. Augustus 1903.
Linden, H. v. d. Iriseerende wolken. Pp. 248–253.
Nell, Chr. A. C. Het zingen von telefoondraden. P. 255.
Hemel en Dampkring. Amsterdam. September 1903.
Linden, H. v. D. Iriseerende wolken. Pp. 270–279.
Bracke, A. Wolkenrimpels. Pp. 280–285.

CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of Mr. H. H. Cousins, chemist to the government of Jamaica and now in charge of the meteorological service of that island, we have received the following table in advance of the regular monthly weather report for Jamaica:

Comparative table of rainfall for August, 1903.

[Based upon the average stations only.]

Divisions.	Relative area.	Number of stations.	Rainfall.	
			1903.	Average.
	Per cent.		*Inches.*	*Inches.*
Northeastern division	25	23	16.54	8.15
Northern division	22	58	8.61	4.55
West-central division	26	25	15.05	9.60
Southern division	27	33	10.95	5.50
Means	100	139	12.79	6.95

The rainfall for August was therefore very much more than the average for the island. The greatest fall, 34.29 inches, occurred at Cedar Valley in the northeastern division while 2.40 inches were recorded at St. Anns Bay in the northern division.

THE HURRICANE OF AUGUST 11, 1903, AT JAMAICA.

By H. H. Cousins, in charge Jamaica Weather Service.

A warning issued by the United States Weather Bureau was received at noon on August 8, stating that a cyclone off Barbados was traveling in a northwesterly direction. Later it was announced: "The disturbance east of Barbados will move northwest over the Windward Islands. Probably of dangerous strength."

Traveling in a direct line the cyclone first struck the extreme eastern end of the island at Morant Point a little before midnight on Monday the 10th. I am of opinion, from the data available, that the central track of the cyclone was through Manchioneal, Moore Town, Claremont, Browns Town, and Falmouth, and thence in a direct line to Grand Cayman and Yucatan where the hurricane finally spent its force.

The destructive zone of the cyclone was a little over 35 miles in width, and it attained its maximum width in Jamaica at a section from Galina Point north of Port Maria to central St. Catherine.

Points just outside this zone and in parallel line therewith are as follows: Port Royal, Hartlands, Rock River, Christiana, Cambridge, and Lances Point, west of Lucea.

This central zone involved destruction or injury to buildings and large trees. The whole of Jamaica, therefore, north of a line from Spanish Town to Lucea has been devastated.

From the records of the United States Weather Bureau office in Kingston the following observations may be drawn: The barometer fell .10 inch between 10 a. m. and 3 p. m. on the 9th; it recovered to 29.9 by 10 p. m. From this time it fell steadily .20 inch until 3 p. m. on the 10th, when a slight rise took place. Standing at 29.8 at 10 p. m., a rapid fall took place, and by 5:30 a. m. of the 11th the lowest point, 29.05, was attained. The rise was twice as rapid as the fall. By 11 a. m. the barometer had risen again to 29.8. The rainfall was only 2.25 inches.

At Moy Hall, in St. Thomas, 14.64 inches fell in 13 hours during the storm. The Kingston records represent those for a point estimated to be 16 miles south of the center of the hurricane. The cyclonic disturbance moved at a uniform rate of a little over 20 miles per hour, and its rotation counter-clockwise accounts for the change from the northwesterly winds during the first half to the southwesterly winds during the final stage of the hurricane.

SOIL TEMPERATURES AND VEGETATION.

By DANIEL TREMBLY MACDOUGAL.

A committee on the relation of plants to climate was appointed at the New York meeting of the American Association for the Advancement of Science in June, 1901, to which was delegated the task of carrying out some work upon the relations of plants to various climatic factors. The actual investigations planned by the committee were entrusted to the author for execution, and a set of thermographs was put in action in northern Idaho in the summer of the same year in addition to the battery that was installed in the New York Botanical Garden. During the following year some thermometric observations were made in the Mission Mountains and Kootenai Mountains, in northern Montana, and a paper was presented at the meeting of the Association in Denver, August, 1901, describing a method of estimating the total temperature exposure of a plant which would be specially applicable and useful in measuring the influence of temperature upon the shoots of plants.

The basal portions of a typical plant, often the larger part of the body, are imbedded in the soil at various depths, and no adequate study of the influence of temperature upon physiological processes could be made until some accurate, graphic, and convenient method was devised for taking continuous records of the soil. The committee was given a second grant by the Association, and additional funds were also voted at the Pittsburg meeting in July, 1902. By the aid of additional contributions from the New York Botanical Garden efforts were made to devise an instrument that would meet the above needs. The committee was so fortunate as to enlist the active interest and practical cooperation of Prof. William Hallock, of Columbia University, who undertook to design a thermograph that would make a continuous record of the soil at any desired depth. A single working model was constructed in the autumn of 1901 and was tested for several months in Professor Hallock's laboratory before being installed in the Botanical Garden, May 2, 1902. A description of this instrument, together with the records obtained for May, 1902, have already been published.[1] It will be profitable to repeat this description here, together with the accompanying illustration (see fig. 1).

The thermal element of the instrument consists of a copper bulb or globe 11 centimeters in diameter (fig. 1, A), with a strengthening equatorial ridge of solid metal, filled with commercial kerosene. A short section of copper tubing with the walls flattened on two sides for convenience of manipulation during construction is soldered to a suitable opening in one pole of the copper globe, and the free end of the heavy tube is likewise soldered to a small copper tube with an external diameter of about 4 millimeters and an internal diameter of 1 millimeter. This tube is also filled with petroleum and may be of any reasonable length up to 10 meters or perhaps more without vitiating the accuracy of the instrument to any appreciable extent. Furthermore, in practise this tube may be variously bent and curved in making adjustments without detriment to the results obtained (fig. 1, C).

The free end of the capillary tube is connected through an opening in the side with the chamber in the interior of a solid

[1] MacDougal. The temperature of the soil. Journal of the New York Botanical Garden. 3: 125–131. July, 1902.

brass block fastened to the base of the apparatus. Two pairs of convex, corrugated brass disks 8 centimeters in diameter are fastened together at the edges and the united pairs are then soldered together forming an expansion chamber composed of two disk-shaped cells, with an opening through the soldered portion (fig. 1, D). Next an opening is made in the center of one of the convex surfaces and this opening is joined by solder to the chamber in the brass block. The double expansion chamber is also filled with petroleum and care is taken to exclude all air from the tubes and chambers. The entire system is now seen to consist of a rigid bulb, tubes, and small base chamber terminating in an expansion structure which may dilate or contract with the alternations in volume of the fluid. It now remains to attach devices for properly demonstrating the movements of the upper wall of the expansion chamber in order to obtain the changes induced in alterations in temperature. To do this an upright post is fastened to the upper wall of the expansion chamber and this is provided with a sleeve and set screw which allows adjustments of its length in connection with a lever (fig. 1, E and F) 4 centimeters long running to an axis held in bearings between two upright standards. A second arm 17 centimeters in length, bearing a suitable pen is attached to this axis and extends so as to come in contact with a suitable upright recording cylinder revolved by clockwork. The long lever is built up of three parts and is provided with a device for adjustment and calibration (fig. 1 H). The cylinder carries double ruled paper and makes a single revolution in a week. In the construction of the working model described here, it was found convenient to use the levers and recording mechanism of a thermograph of German manufacture, the slips of which were ruled for degrees centigrade. The instrument was calibrated to meet these requirements, but new models now under construction are designed on the Fahrenheit scale. The improved model may also be constructed to carry thermal apparatus for taking air temperatures on one end of the base and the soil temperatures on the other end, thus making synchronous records.

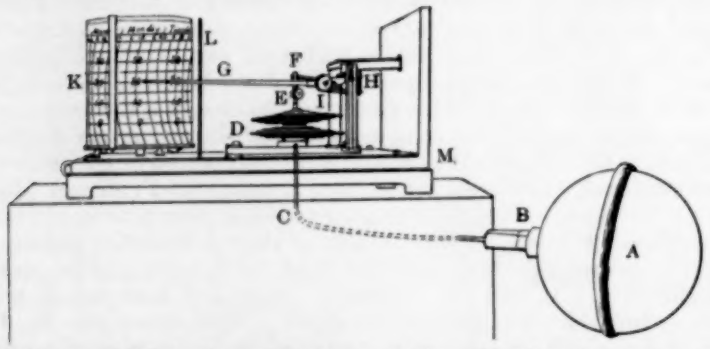


FIG. 1.—Hallock thermograph. A, bulb containing kerosene. B, heavy tube, soldered to polar opening in bulb. C, capillary tube connecting bulb with expanding chamber. D, double expanding chamber. E, upright post with adjustment clamp at E, on expansion chamber and fastened to short lever arm at F. G, lever extending from axis, and bearing pen, which traces temperature record on the cylinder. H, adjustment to raise or lower pen in making corrections and calibration. K, cylinder driven by internal clockwork which makes one revolution per week. The cylinder carries paper ruled horizontally to degrees centigrade. The rate of movement carries the paper past the pen at such rate that two hours is taken to pass over the interval between two curved lines. L, upright rod on hinged base to remove pen from contact with paper. M, base of cast iron.

The peculiar value of the above apparatus consisted in the fact that the recorder could be kept in an instrument shelter of any convenient pattern and the sensitive bulb carried out and buried in the soil at any desired distance from the shelter, or at any depth in the soil, by which the actual temperatures encountered by the roots of plants might be obtained. In practise it was found that the amount of liquid in the capillary tube and expansion chamber was so small in proportion to that in the bulb that the temperatures encountered by the tube or chamber made no observable error in the reading of the instrument. This was true to such an extent that the flame of an alcohol lamp applied to the tubes did not produce any change in the position of the pen upon the recording slip. The same is true of the effects of direct exposure to the sun's rays.

The location for the installation of the instrument for the trial series of records for the first year was a small area of clayey soil mixed with loam lying near the propagating houses and nurseries in the New York Botanical Garden. The drainage is free, as the surface of the ground is slightly sloping to the eastward. During the summer the place is covered by the shade of some cherry trees after 4 p. m.

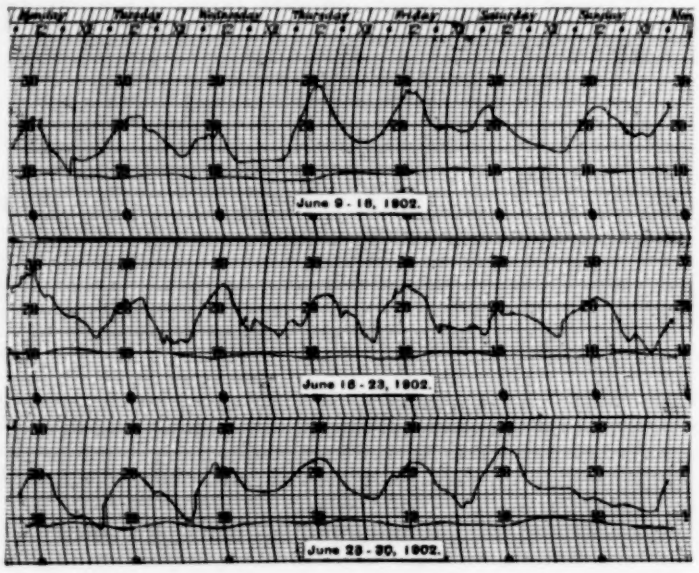


FIG. 2.—Tracings of thermographic curves of air, and of soil at a depth of 30 centimeters (1 foot), June 9–30, 1902. The daily periodicity and the direct effect upon the soil of changes in air temperatures are illustrated. Centigrade scale. The temperature of the air is shown by the uppermost of each pair of tracings.

In the installation of the instrument the recorder, together with an air thermograph, was placed in an instrument shelter of the United States Weather Bureau pattern. The capillary tube passed through the floor of the shelter to the surface of the ground, being protected from mechanical injury by being placed in a grooved board. A narrow trench 2 meters long and about 20 centimeters in depth was dug and was then prolonged in a tunnel to a farther distance of 50 centimeters. This tunnel was only large enough to receive the bulb, and after that had been pushed to the farther end of the tunnel the excavated soil was packed around it in a manner as nearly natural as possible. By this arrangement the layer of soil above the bulb was left undisturbed and artificial drainage conditions were not introduced. This arrangement brought the upper surface of the bulb in contact with the soil penetrated by the matted roots of grasses and other small herbaceous plants, which also extended much deeper around the excavation.

The greater bulk or volume of the root system of the smaller plants usually lies nearer the surface of the soil than the position of the bulb of the thermograph, but the important function of absorption is carried on chiefly by the younger, most recently formed terminal portions of the roots which lie deeper in the soil. The rate at which mineral and other substances in solution in the soil are taken up, the permeability of the protoplasmic membranes, the turgidity and consequently the rigidity of the roots are also greatly affected by temperatures, while the growth of these organs, together with their endur-

ance and that of all underground organs, depends not only upon the actual temperatures encountered, but also upon the rapidity with which changes ensue.

FIG. 3.—Tracings of thermographic curves of the air, and of the soil at a depth of 30 centimeters (1 foot), June 30–August 4, 1902. The maximum temperatures of the year are included. Centigrade scale. The temperature of the air is shown by the uppermost of each pair of tracings.

Before being placed in position the air thermograph and the soil thermograph were placed in a closed room with a standardized mercurial thermometer (No. 2792, G. S. Reichs-Anstalt, Berlin), and were found to read alike to within a small fraction of a degree, allowing for a slowness of response by the thermographs.

The records on hand now embrace a period of fourteen months, and the facts obtained seem to be of sufficient interest to warrant their discussion at the present time, together with some of the actual curves traced by the instruments.

It may be seen from these that the maximum daily temperatures occurred between 8 and 11 p. m., and the minima twelve hours later, or between 8 and 10 a. m. The optimum temperature for absorption by roots lies well above that of the soil at the depth at which the observations were made. It follows, therefore, that the temperature of the soil approaches this optimum most nearly, and offers most favorable conditions for the taking up of watery solutions at a time of the day when the amount of water thrown off by the shoot and of mineral matter used in metabolism are nearing the minimum by reason of the absence of light, lowered air temperature, and consequent increased humidity of the air. These inharmonious conditions account almost wholly for the profusion of guttation excretions or "dew drops" formed on the tips and margins of grass blades and leaves of low growing plants early in the evening. Absorption by the root continues quite vigorously after sunset by reason of the favorable temperatures, and the augmented amount of fluid in the cortex of the roots sets up a pressure which ultimately forces water into the central cylinder and up through the woody cells faster than it may be used and transpired by the thin-walled cells of the leaves. The vessels become filled with water which is forced out in liquid form through the excretory openings in the form of drops. In some species the amount of water coming away from the plant in this manner may reach quite an appreciable quantity.

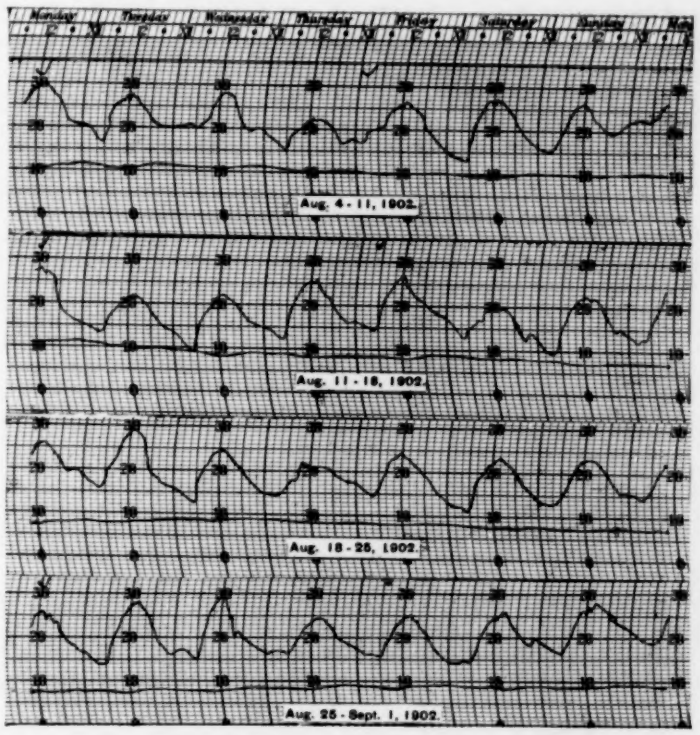


FIG. 4.—Tracings of thermographic curves of the air, and of the soil at a depth of 30 centimeters (1 foot), August 4–September 1, 1902. A period during which comparatively little fluctuation and variation occurs. Centigrade scale. The temperature of the air is shown by the uppermost of each pair of tracings.

On the other hand the forenoon witnesses the rapid acceleration of transpiration by all parts of the shoot at a time when the soil temperature is decreasing to a minimum. The increase of transpiration continues until mid-afternoon, while the temperature of the soil reaches a minimum two or three hours earlier and then begins to rise, but does not do so sufficiently to favor absorption to any great extent. It is true of course that the needs of the leaves may be partially met by the activity of the rootlets which lie nearer the surface.

The greatest amount of variation during twenty-four hours that was recorded during the year amounted to 2° C. (3.6° F.). This amplitude was shown on two occasions. June 28, 1902, the temperature rose from 8° C. (46.4° F.) at 10 a. m. to 10° C. (50° F.) at 10 p. m., in consequence of an increased temperature of the air, reaching a maximum of 27.8° C. (82° F.) at 1 p. m. The temperature of the soil fell from 12° C. (53.6° F.) at 11 p. m., on July 16, 1902, to 10° C. (50° F.) at noon on the following day. Curiously enough this minimum coincided exactly with that of the air a meter above the surface four hours earlier. A reverse movement of any kind greater than 1° C. has not been recorded within the limits of twenty-four hours. These slow changes in the temperature of the soil would exert no stimulative influence upon the action of the roots. Thus, for instance, a sudden and great diminution of the temperature of a root temporarily would increase the rate of absorption which, however, soon begins to decrease again. The least daily variations occurred during the winter months, when it did not exceed (1° C. (1.8° F.).

It is interesting to recall in this connection some of my own observations on the temperatures of the roots of small herbs and grasses in Arizona which were growing in volcanic sand. The observations were made by mercurial thermometers in 1898, and it was found that these organs were carrying on their functions under temperatures as high as 44° C. (111 + °F.) to 45.5° C. (114 °F.).

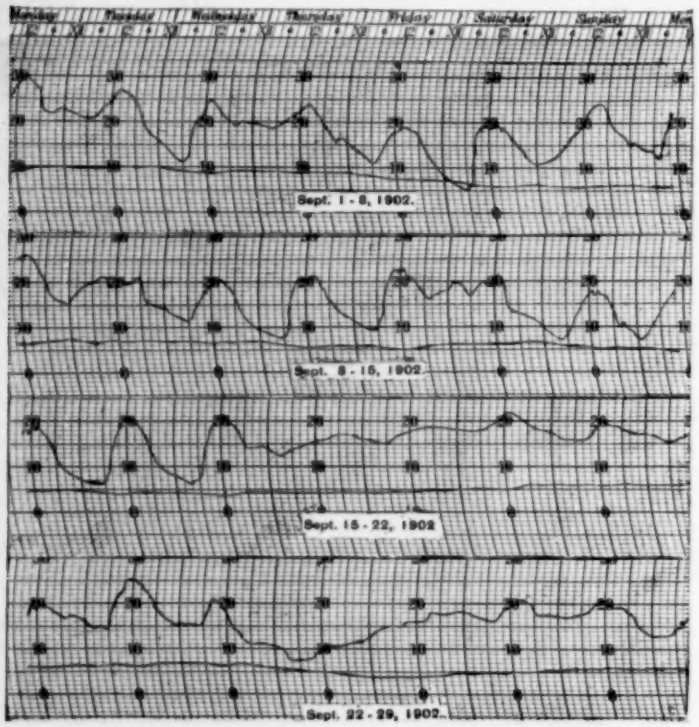


FIG. 5.—Tracings of thermographic curves of the air, and of the soil at a depth of 30 centimeters (1 foot), September 1–29, 1902. A general decrease in the temperature of the soil amounting to about 5° C. was shown. Centigrade scale. The temperature of the air is shown by the uppermost of each pair of tracings.

The general course of the temperature and the nature of the variations is shown by the accompanying tracings (see figs. 2 to 7) and the following data:

Temperatures of soil at a depth of 1 foot (30 centimeters) from June, 1902, to June, 1903 (degrees centigrade).

	1902.							1903.				
	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
Maximum...	12.7	13.2	12.0	10.0	6.0	0.0	3.5	4.0	7.0	9.5	8.0	9.0
Minimum...	7.6	7.5	7.4	3.7	−1.5	−2.5	−3.0	3.0	5.0	7.0	4.0	6.0
Variation...	5.1	5.7	4.6	6.3	7.5	2.5	6.5	1.0	2.0	2.5	4.0	3.0

The maximum temperature for the year, 13.2° C. (56° F.), occurred in July, and the minimum, —3° C. (26.6° F.), in December, giving a total annual variation of 16.2° C. (29.4° F.).

When plants are cultivated in pots, in green houses, the small volume of soil around the roots responds much more rapily to changes in the temperature of the surrounding air and to the influence of streams and sprays of water than does the upper layer of soil in the open. In general the soil in the green house will show a much higher average temperature, which, with the other conditions mentioned, makes necessary special treatment on the part of the gardener. If the natural conditions of water supply by precipitation were complied with the needs of the plant would by no means be met under the altered conditions of temperature.

Not the least interesting feature of the records are the data concerning temperatures during the winter months when vegetation is supposedly in a resting condition. The first general drop occurs early in September when the temperature is lowered 5° to 6° C. (9° to 10° F.). A month later a second general downward movement was noticeable, in October, which reached the freezing point on October 22. After a few days fluctuation about this point a decrease began which reached the annual minimum of —3° C. (26.4° F.) on December 10. A heavy snowfall was followed by a steady rise which carried the temperature above the freezing point on December 15. The total period during which temperatures below the freezing point occurred included only fifty-four days, and the thermograph recorded freezing temperatures on but fifty days of this time. After the above date the rise was steady and continuous with minor fluctuations.

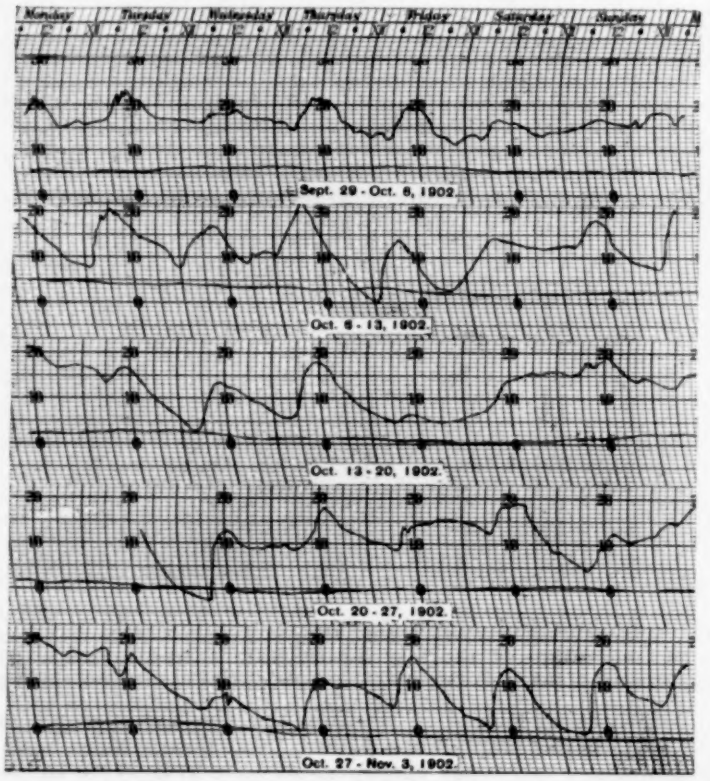


FIG. 6.—Tracings of thermographic curves of the air, and of the soil at a depth of 30 centimeters (1 foot), September 29–November 3, 1902. A further drop in temperature is shown which carries the soil below the freezing point temporarily on the 22d, and finally for the season on the 29th. Centigrade scale. The temperature of the air is shown by the uppermost of each pair of tracings.

Both the maxima and minima are higher in January than in December and are still higher in February, at which time the temperature of the air reaches its annual minimum. As a consequence of the above conditions the roots of plants at a depth of a foot (30 centimeters) in this locality find increasingly more favorable conditions for activity after the latter part of December. Growth and division of the cells, and the attendant respiration would ensue in many species at an accelerated rate over that prevalent in the earlier months of the winter and the absorption of mineral and other compounds could take place to the utmost capacity of the plant. This will still be more apparent when it is seen that the temperature of the soil at a depth of a foot is but little lower in February than it is in April or May at a time when the growth and formation of new organs in the shoot is at a maximum. The approach of the spring season in this locality therefore finds the root systems and absorbing organs of the vegetation which penetrates the soil to the given depth in a state of comparatively

great activity, and it needs but the exposure of a few days or even of a few hours in some plants to allow for very marked development of the stems, leaves, and flowers.

Another point of interest in the present connection is the fact that such notable differences are found between the temperatures of the subterranean and aerial portions of the bodies of plants at almost all seasons. During June, 1902, the shoots of herbaceous plants were in an atmosphere that varied between 8° C. (46.5° F.) and 34° C. (92.5° F.), while the roots were between 8° C. (46.4° F.) and 13° C. (55.4° F.). As the maxima and minima were not synchronous the actual difference between the temperature of twigs and leaves on the upper part of the plant, and roots on the lower amounted to as much as 22° C. (nearly 47° F.) at certain times of the day. Such conditions occur, though slightly less accentuated, during the entire summer in this locality. It is evident without further discussion that such differences in the temperature conditions of the two poles of the plant must exert a more or less important influence on the transport of fluids and solutions from one part of the plant to another. Referring to the previous discussion concerning the comparative transpiration and absorption during the day it is to be seen that the heightened temperature of the shoot must operate in a simple physical way to greatly augment the amount of water thrown off while the roots must take in water at the same time to meet the loss at a temperature as much as 47° F. lower.

During the movement of the water from the roots to the leaves of grasses and other low growing plants, a total distance of no more than 50 centimeters (20 inches) may be traversed, occupying a matter of a few minutes, or an hour at most, during which time the temperature is raised the above amount. The warming of the liquid as it passes upward through the living and nonliving cells is attended by alterations in its solubility of mineral and organic substances and by a decreased capacity for holding gases in solution. The downward movement of solutions of sugars, acids, and nitrogenous substances from the leaves encounters the opposite set of conditions. This movement takes place almost entirely by osmose and diffusion and is a much more complicated process, both chemically and physically, taking place in living cells only. The cooling of the liquid would entail alterations in its power of carrying substances in solution and would also alter its physical relations to the atmospheric gases present.

It may be said, in conclusion, that the facts disclosed as to the actual temperatures in the soil, the diurnal and seasonal changes therein, and as to the differences in temperature of the aerial and underground portions of plants can not fail to be of very great importance in the physical and chemical processes, upon which growth, cell division, nutrition, and propagation depend. The determination of the effect of differences in temperature between the roots and aerial shoots has received but little consideration from the physiologist and the geographer. A careful analysis of the conditions and results of experimental observations carried on with plants under artificial conditions, with the roots and shoots under abnormally similar temperatures, would no doubt result in the detection of many mistaken conclusions, especially in regard to absorption, translocation, and transpiration.

That soil temperatures and the relations of these temperatures to those of the air must be of very great importance in the cultivation of economic plants is self-evident, especially in species in which the desired useful portion is formed underground and receives storage material formed by the activity of the aerial organs. Thus, in the case of such plants as the potato, certain mineral substances are absorbed from the soil at a comparatively low temperature, carried aloft into the heated leaves, where they participate in activities resulting in the formation of sugars, starches, and other carbohydrates, perhaps some nitrogenous substances as well, and then these complex bodies are slowly diffused downward, with many accompanying chemical and physical modifications, to underground cool storage organs, where a condensation occurs and the products are stored in insoluble form in the tuber.

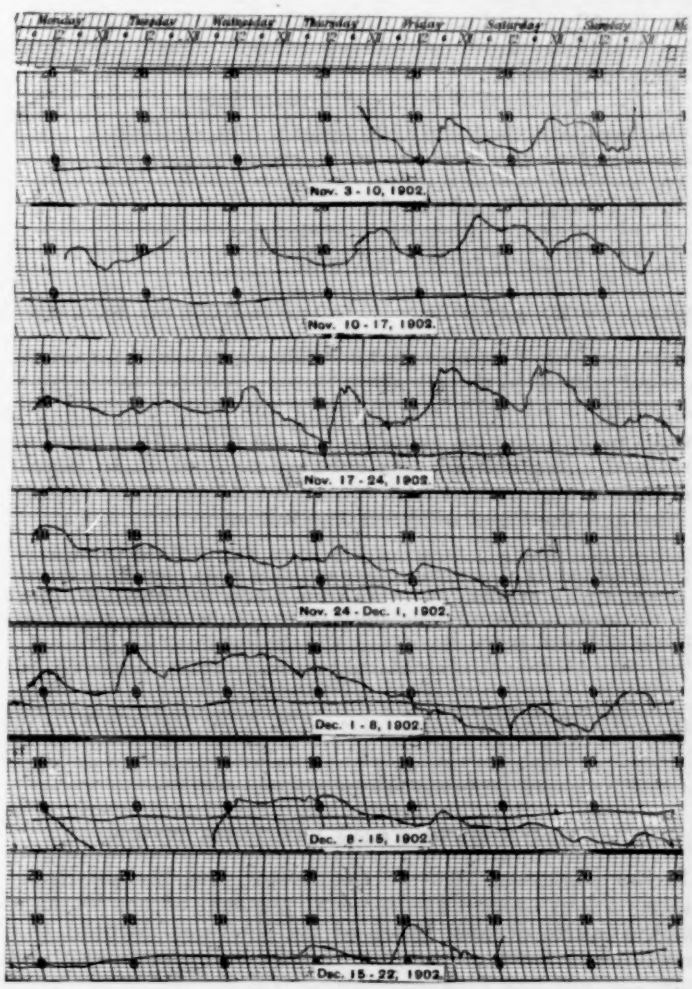


FIG. 7.—Tracings of thermographic curves of air, and of the soil at a depth of 30 centimeters (1 foot), November 3–December 15, 1902. The soil remained below the freezing point until December 8, when it began to rise steadily, and did not fall below freezing point during the remainder of the winter. Centigrade scale. The temperature of the air is shown by the uppermost of each pair of tracings.

NOTES AND EXTRACTS.

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. J. S. Hazen, Observer, Weather Bureau, Springfield, Mo., under date of August 1, incloses for inspection some manuscripts and charts covering a portion of the work done by him in the Drury College Summer School just closed. He states that he prepared eleven lectures in typewritten manuscript and also charts to illustrate them, and that these will probably be published in the series of articles in a leading newspaper of Springfield as a series for use in the winter schools. The work was undertaken at the request of Professor Childs for his class in physical geography. The class consisted of from ten to twelve teachers and the interest was such that they met twice a week at the Weather Bureau office, after office hours, during the summer school term of six weeks, usually taking an hour and a half for a lesson. A few members of the class

had text-books on meteorology, the others had to depend on the office library and the text-books in physical geography. Much drill and practical work was imposed on the class, especially in drawing daily isotherms and isobars, rainfall charts, and annual temperature charts. The various instruments used in the Weather Bureau were fully explained. Cloud types were studied from photographs and from the tower of the building on an especially favorable day. Flattering enthusiasm was shown by the class, and all expect to use their practical knowledge in school work. No compensation was received, but the class gave a vote of thanks. The following is a list of the lectures:

No. 1.—Outline of course with history and work of Weather Bureau.

No. 2.—Exhibition and description of the meteorological instruments in general use by the Weather Bureau.

No. 3.—Class work in drawing isotherms and isobars.

No. 4.—Class work in drawing rainfall charts and annual temperature charts.

No. 5.—The weather map and forecasting.

No. 6.—Distinction between climate and weather.

No. 7.—Heat and how the air is warmed.

No. 8.—Cyclones and anticyclones.

No. 9.—Rainfall and clouds.

No. 10.—Optical phenomena of the sky.

No. 11.—General review and quiz.

THE METHOD ADOPTED IN CONSTRUCTING NORMALS.

Between July 6 and August 3, 1903, a number of memoranda were submitted to the Chief of Bureau relative to the proper method to be pursued in computing the daily normals of the various meteorological elements. Four different systems were described. The subject was referred to Prof. F. H. Bigelow, and certain conclusions and recommendations were approved by him and the Chief of Bureau as follows:

Before undertaking to form normals upon any of these systems (1, 2, 3, 4) the individual observations by months at least should be corrected (*a*) to the same elevation; (*b*) to the same shelter and observing system; (*c*) to the mean of twenty-four hourly observations; (*d*) to a long series of thirty standard years, January 1, 1873, to December 31, 1902.

The third system, viz, taking the means by months, plotting these, and drawing an annual curve and then interpolating along the curve for the individual dates, so as to get the normals for those dates is adopted as the method for getting normals for use in computing daily departures. On the other hand, the means of all the observed values for the same date such as January 1, January 2, etc., will be computed as hitherto and held for special study but not for regular use.

FROM NEW YORK TO CAPE TOWN.

In the winter of 1889–90 the Editor had the privilege of making a tour around the tropical portions of the North and South Atlantic oceans; much of his time was devoted to observations of the movements of winds and clouds and an attempt to gain new light on various features of the circulation of the atmosphere over these oceans. On the outward voyage from New York, we touched at Fayal, St. Vincent, Freetown, Elmira, Loanda, and reached Cape Town in January, 1890; returning thence we visited St. Helena, Ascension, Barbados, and Bermuda, reaching New York on May 27, 1890. Some account of this voyage and the meteorological work was given in the Editor's preliminary report of May, 1890, published in the American Meteorological Journal, October, 1891. This study was only a first feeble attack on this important problem. The fundamental question that still remains open is this: Is there an upper current moving steadily eastward or westward above any part of the equatorial portion of the Atlantic; to this problem anyone may contribute who sails from New York to Cape Town or in general anyone who crosses the equator at any latitude. It seems likely that there are both periodical and irregular variations in the general circulation due to the large influence of the continents, so that numerous voyages or a long, systematic series of observations will be needed in order to understand the subject. There is needed not only the kite work proposed by Mr. Rotch (MONTHLY WEATHER REVIEW, April, 1902), but a long series of careful observations during voyages in equatorial regions.

Travelers and navigators who provide themselves with marine nephoscopes and cultivate continuous observations of clouds and winds as they pass from the north to the south, or vice versa, will inevitably add much to our knowledge. The masters of all vessels, both steamers and sailers, can well afford to encourage such work as this that conduces to make navigation safer and quicker.

The voyage from New York to Cape Town or Mauritius is most easily made on the freighters of the Union-Castle Line; from New Bedford to St. Helena and back one may take a New Bedford whaler. The voyage from Vancouver or San Francisco to New Zealand or Australia and the voyage from England or Portugal to Brazil and Argentina as well as to Cape Town and India or even the voyage from San Francisco to Valparaiso are matters of every day travel. Thus, it would seem that it should not be difficult to find many opportunities to secure continuous series of cloud observations or meridional sections of the atmospheric currents in the North and South Temperate zones and the intermediate equatorial regions.

A special interest in this class of work is stimulated by the consideration that the land hemisphere of the globe, having London as its north pole, includes both the Eastern and Western continents and the North and South Atlantic oceans, leaving the Pacific and the Antarctic, or the great Southern Ocean to make up the aqueous hemisphere. The North and South Atlantic are therefore comparatively small inclosed seas and the circulation of the atmosphere over them is largely a matter of annual interchange of air over land and ocean, plus the influence of the great whirls that move eastward from the North and South Pacific over the temperate portions of North and South America, respectively.

In connection with the above-mentioned study, we note the recent publication by the Union-Castle Mail Steamship Company (8 and 10 Bridge street, New York), of a beautiful Atlas of South Africa, illustrating the tracks of its steamers, the history, geography, and climate of the South African states. We know of no better publication as a source of information on these points. The study of geography in our modern schools includes climatology and history as essential factors, and both are well presented in this work, which is really more convenient than Greswell's Geography of Africa, south of the Zembesi. Americans in general probably have no adequate realization of the extent to which south Africa is filling up with a European citizenship. The coast plateau, 50 miles or less in width; the southern Karroo and the great Karroo, 250 miles wide and 2500 to 3500 elevation, and the northern Karroo with the lofty range of the Drakensberg (Sneeuwberg) up to 11,000 feet elevation, form attractive locations for plantations when once the proper steps have been taken to provide for water and irrigation. The atmosphere of south Africa, or the "Land of Sunshine," is remarkably pure, clear, and invigorating, apparently superior to that of the mountains of North America or Europe, owing to the great mass of pure ocean air that flows over it from southeast and southwest. The dryness of the air under high temperatures is quite agreeable and stimulates human activity, just as it does in our own dry regions. Cape Town, at latitude 34° south, has a mean of maxima in January of 82° and a mean of minima in July of 46°; mean annual, 62° F.; with which compare Wilmington and Charleston, at the corresponding northern latitudes on our Atlantic coast. Many of the climatic features

that we are familiar with in the arid regions of the United States also occur in south Africa. The climate of the coast of Cape Colony is warm, moist, and equable; that of the midland is colder and drier in winter and hotter in summer; the mountain climate is drier still and more bracing, but with extremes of heat by day and cold by night. In the eastern portion of south Africa hot winds are occasionally experienced during the summer; they come from the northwest and blow as if from a furnace; fortunately, they are not of long duration. Like the hot winds of Kansas and Nebraska, these are undoubtedly descending and warmed by compression, like the föhn of Switzerland and the sirocco of the Sahara.

The climate and agriculture of south Africa go hand in hand, for the soil is intrinsically very fertile, and wonderful results have been attained at the Irene estate near Pretoria. (See Letters from South Africa. Macmillan & Co., New York.) The Editor can add his own testimony as to the wonderful vineyards near Cape Town and along the coast districts, where the average production per vine or per acre is greater than in California.

The 22 double-page maps and the index make the Union-Castle Atlas a most acceptable addition to our library of works on climatology and geography. They will also be most useful to the students of the history of south Africa.

THE TEMPERATURE OF THE UPPER AIR AS OBSERVED ON MOUNTAINS AND WITH KITE METEOROGRAPHS.

The Report for 1902 of the British Association for the Advancement of Science, contains a short note on atmospheric temperatures and currents observed by means of kites in January and August, 1902, on the west coast of Scotland at Crinan, about 25 miles south by west of Oban and 70 miles southwest of the summit of Ben Nevis. Only £175 (875 dollars) were available for the purchase of the steam winding engine and other apparatus. The steam winder or reel was so adjusted as to run rapidly when the tension on the steel kite wire slackened, but slow up or stop or even reverse when the tension increased above a certain limit of safety. The author of the report and secretary of the committee, Mr. W. H. Dines, preferred various English devices to the American system of kites and apparatus. He says:

> In addition to the well known Richard instruments which have been ordered, it seemed desirable to obtain if possible, something cheaper, since the risk of losing the instrument is not small. I am experimenting with a cheaper form. I also hope to obtain correct determinations of the maximum height and the temperature at that height in the following manner. If a glass tube of uniform bore, sealed at the top, but with the other end under water or quicksilver, were sent up with a kite, it would, assuming constant temperature, give the maximum height, for the air in the tube, under the decreased pressure, would expand and bubble out, and on the descent, water would rise in the tube, and the height of the water or quicksilver would give the minimum pressure, and hence the maximum height. This is assuming constant temperature. But if an exactly similar tube were also used containing saturated vapor of alcohol, two equations would be obtained, from which the two unknown quantities, temperature and height, can be determined. I hope to perfect this method, since there are many occasions on which a kite and a couple of glass tubes might be risked when one would hesitate to send up instruments costing £20.
>
> The apparatus above described is now in use every day when the wind is suitable, but there seem to be very many days during the summer when a sufficiently strong wind does not occur. A velocity of about 15 miles per hour is necessary, or force 4 on the Beaufort scale; but the upper limit at which the kites will fly has not yet been determined.

The experiments detailed in this quotation seem at first sight to be in the wrong direction. The Marvin kites have often broken loose and been recovered. Sometimes the kite is slightly damaged, but the meteorograph never. We believe that there is no cause for anxiety as to the loss or injury of the expensive recording apparatus. The substitution of any arrangement for "recording minimum pressures and corresponding temperatures" means the loss of any reliable determination of the vertical gradients of temperature and their changes with altitude which are precisely the data that are needed in studying the problems that occur in modern meteorology. Mr. Dines states that the location of the kite station at Crinan was chosen because it seemed likely to give information as to the vertical temperature gradient over the great oceans, since the prevailing westerly winds must make observations at Crinan equivalent as a rule to those over the open sea. [Crinan seems to be surrounded by land and not by open sea.] It was also thought that some light would be thrown on the question as to how far the temperatures taken on a mountain summit (Ben Nevis) differ from those of the free air at the same level in the surrounding districts. Up to August 20, 68 flights had been obtained, and during these the lower winds were distributed as follows:

Land winds from NNW., N., E., SSE	15
Ocean winds from NW., W., S., SE	52
Blanks	1
Total	68

The heights attained seem to be rather lower than those reached in America with the same length of line paid out, but the wind velocities must be measured before we can compute the relative efficiency of the kites. We quote some of Mr. Dines's figures as a guide to those who wish an estimate as to the length of line needed in order to attain any desired altitude:

Vertical altitude, feet.	Length of line, feet.
6,400	10,300
6,000	10,300
4,760	10,600
5,500	10,200
7,250	12,000
8,950	17,300
8,550	16,000
8,370	13,500
6,900	12,000
7,175	13,000
7,425	18,000
11,450	21,350

The committee indorse Mr. Rotch's idea as to the importance of using a small steam vessel as a base station so as to be independent of feeble winds and calms.

In addition to the above report, Mr. Dines has given the discussion of his results in the Quarterly Journal of the Royal Meteorological Society. He has also published a general statement in Nature for June 18, 1903, p. 154, from which we quote the following:

> The evidence obtained from last summer's work is not sufficient to be conclusive, but so far as it goes it tends to show that as a depression approaches the decrease of temperature with elevation becomes less than it was before. This was the case with every depression that passed while the experiments were in progress, and it leads to the conclusion that the upper air in the neighborhood of a cyclone is relatively warm and that the cyclones are convectional effects.
>
> A further result of the observations shows that the temperature of Ben Nevis was in every instance below that of the free air at the same level some 60 miles to the southwest, often from 5° to 8° F. below. That the two air temperatures should have agreed was hardly expected, but the difference was very marked, and it is desirable that the experiments should be repeated in the same locality to confirm the result. The fact, however, that the summit of the mountain is so often wrapped in clouds when the sky is clear elsewhere, tends to show that the summit must be unduly cold, and it seems likely that the effect is produced by the adiabatic cooling of the air as it is forced up the mountain slope. In fact, the cloud level on all the mountains and hills in the neighborhood was always much below the point at which the kites entered the clouds. It is also known from the differences in the barometer on Ben Nevis and the values computed from the Fort William readings that the temperature of the intermediate layers of the air is not truly represented by the mean derived from the summit and sea-level temperatures.[1]

[1] This is a general rule for all high and low stations, as was shown by R. Rühlmann in 1870 and by C. A. Schott about the same date. It has been confirmed by many studies since that time.—*C. A.*

HURRICANE AT MARTINIQUE, AUGUST, 1903.

The following account of the passage of this hurricane over Martinique is communicated by Dr. A. Lahille, chemist in charge of the meteorological observations for the chief of the sanitary service at the Military Hospital at Fort de France:

During the night of August 8–9, 1903, a cyclone coming from the northeast–north–northwest, passed over Martinique.

The barometric pressure which, with numerous oscillations, had fallen during the day of the 8th, had nevertheless remained as high as 758 millimeters, or above, until about 9 p. m. From that time, however, the pressure fell rapidly and reached its minimum, 728 millimeters at 12:30 a. m. From 12:30 to 12:45 a. m. a relative calm succeeded, corresponding to the passage of the center of a cyclone. At 12:45 the hurricane recommenced blowing from the south–southeast. August 9, at 2:30 a. m., the pressure was 753 millimeters, and at 4 a. m., 756 millimeters. The amount of rain which fell during the night from 8 p. m. to 8 a. m. was 160 millimeters.

The maximum velocity of the wind, as recorded by the anemometer, was 35 meters per second.

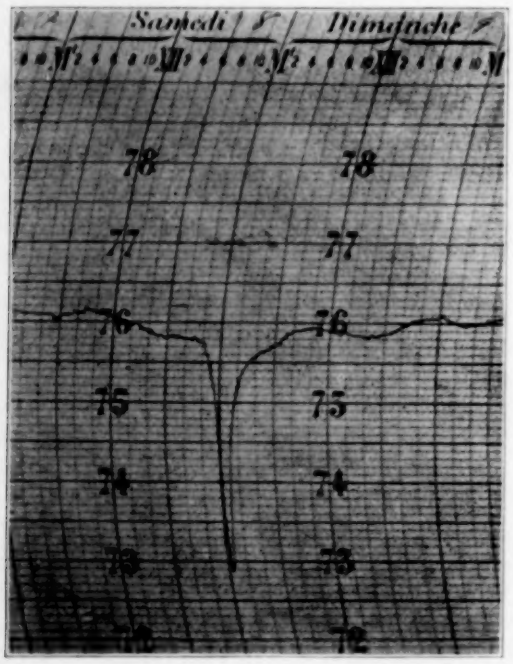


FIG. 1—Barogram from the Richard barograph, large model, at the meteorological station, Military Hospital, Fort de France, during August 7, 8, 9, 1903. The time scale probably relates to local mean time.

THE RESIGNATION OF H. SOWERBY WALLIS.

It is well known to meteorologists that the great system of rainfall stations and publications, known as the British Rainfall, was organized by Mr. G. J. Symons, and that at his death he left his house and other property as an endowment for the permanent continuation of this important work. His assistant, Mr. H. Sowerby Wallis, was designated by him as his successor, but we regret to learn that it has become necessary for him to retire. Under date of September 1, 1903, Mr. Wallis sends the following letter to the Editor:

DEAR SIR: After thirty years association with my late friend, G. J. Symons, in the development of the rainfall organization, by his desire, I took up the burden of his work with grave misgivings that my health would not long support the strain.

Frequent illness now prevents me giving it continuous attention, and for me to remain in charge could only be a source of weakness. I therefore feel that the time has come for me to pass on the control of the work, and I am glad that so able a successor as Dr. Mill is ready to take up the onerous task. I am handing over to him all the records and instruments, and leaving this house, that he may continue the organization, without a break, at the old address.

Dr. Mill had devoted much attention to rainfall, and for three years we have conjointly carried on the work while he acquired that intimate knowledge of detail so essential to ensure continuity on the lines approved by experience.

In thus taking leave, while naturally regretting the termination of a life long labor with which many pleasant memories are associated, I would congratulate the nation on possessing a body of private individuals who have, for nearly half a century, kept up a national work of the first importance, and who may be trusted to maintain it in perpetuity.

Yours, very truly,

H. SOWERBY WALLIS.

RETIREMENT OF PROFESSOR NEUMAYER.

We learn that Prof. George von Neumayer, director of the Deutsche Seewarte at Hamburg for many years past, has been retired on account of advanced age and ill health, and that Captain Herz, of the imperial navy, has been appointed his successor with the rank of rear admiral. The Seewarte has hitherto been distinguished for its devotion to the scientific aspect of meteorology, while not neglecting the practical applications. It has in fact introduced so much accuracy into the magnetic, meteorologic, and geographic work of the German Navy that it may be said to have demonstrated that science is eminently practical, and that the highest science must be assimilated by the navigator if he would do his own special work in the most satisfactory manner. With such an eminent scientific man as von Neumayer at its head the Seewarte has been an inspiration to German navigators.

Our contemporary, Nature, states that the appointment is explained on the theory that a man of science at the head of the executive office is so overburdened with administrative work that he has no time for scientific investigation. But one might as well say that a practical man at the head of a large office is liable to be so overburdened that he has no time for his private affairs. The whole question is simply one of organization. The chief of a bureau may so select his subordinates, assign their duties, and economize his own time as to find opportunity for any special personal work that he is specially qualified to perform. Men of energy and business ability are to be found among scientific men quite as frequently as among military officers, at least this is the experience in England and America. All modern arts, including the art of war, are applications of modern science, and as a general rule the practical scientist is a safe leader.

LOCAL STORM IN BALTIMORE, MD.

Mr. Edward O. Easton, Observer, temporarily in charge of the station at Baltimore, Md., reported, on July 14, on the storm of Sunday, July 12, in that city, from which we make the following extracts:

The time of the greatest damage appears to have been about three minutes after noon. No damage occurred in the vicinity of the office of the Weather Bureau, at the Johns Hopkins University, but a heavy thunderstorm was experienced there. There were two areas of extreme severity. The first, probably, in order of occurrence, embraced much of the 1700 blocks of Fulton avenue, Mount street, and Calhoun street, the second extended from Eager street and Broadway eastward for 6 blocks, and was from 2 blocks to less than a block in width, narrowing irregularly. In the first named area a funnel-shaped cloud was distinctly observed by a number of the residents, but no very definite account of its manner of formation was obtained. In the second district, where the damage was greatest, more explicit information was obtainable, of which the following is the substance: A heavy storm cloud approached from the northwest and another from the southwest; they apparently merged at Eager and Broadway, where the destruction abruptly began. The funnel-shaped cloud was seen by many, and a heavy roaring sound was followed by almost complete darkness as the storm burst. The upper cloud mass was distinguishable, however, with its narrowing extension downward, the latter appearing to lag slightly behind the mass above in its movement eastward. The whole traveled with almost incredible velocity (so it is stated) only a few seconds elapsing between the time the cloud descended to the housetops at Eager and Broadway until it rose into the air again 6 blocks to the eastward.

In both districts the nature of the destruction pointed clearly to the claims made that the city had been visited by a tornado. Some walls were blown outward, as though by sudden expansion of confined air

within, but fully as many fell inward. In one case the four walls bulged outward, and the roof lay within about half way down to the floor of the second story, while not far off roofs had been lifted high into the air and carried a block and a half away before being deposited in an alley.

* * * * * * *

In all, several hundred houses were unroofed or otherwise badly wrecked. The money loss has been estimated at $200,000.

ILLNESS OF PROF. ALFRED J. HENRY.

The students of the daily weather map were quite puzzled on October 7 to find that Professor Garriott had succeeded Professor Henry as forecaster for the month of October. Inquiry revealed the fact that in consequence of a sudden affliction of the eyes Professor Henry had been taken to the University Hospital for treatment for "displacement or falling of the retina of the left eye." We are happy to add that he is improving and that there is good reason to believe that he will return to duty in a month or six weeks.—*C. A.*

NOTES UPON ECONOMICAL SHAPES FOR CUTTING ENVELOPES OF BALLOONS.

Referring to Professor Marvin's article under the above heading in the MONTHLY WEATHER REVIEW for July, 1903, a casual examination of fig. 4, page 315, might lead one to assume that the outline of the end gores of a 15-gore field of the "baseball" type is determined by a circle having for its center the projection of one of the poles p_1, p_2, p_3, p_4, and for its radius half the length of one of the central gores. The point of projection of these poles is at the center of the third gore from the end of the field.

A little consideration will show, however, that such a determination of the outline would not be correct, since the adjacent edges of any two gores must be of equal length, and this length, in degrees of a great circle, is $90° - b$, where

$$\sin b = \sqrt{(\sin 45°)^2 + (\sin 45° \tan a)^2},$$

and a is the distance in degrees from the pole to the point through which the length of any meridian of the gore is to be measured.

The data for the lengths of the edges and central meridians of the gores that fall outside the poles in a 15-gore field is as follows:

(a). Distance from pole.	90° − b.	Length of gore in percentage of length of central gore.
°	° ′	
9	44 17	98.4
18	41 58	93.3
27	37 29	83.3
36	29 0.7	64.5
45	0 0	0.0

H. H. K.

CORRIGENDA.

In the MONTHLY WEATHER REVIEW for July, 1903, p. 316, column 2, line 16, make $\frac{\text{"}14.007\pi^2R^2\text{"}}{10}$ read "$14.047\pi R$."

On the same page in fig. 7, for "80° 24′ 10″" read "83° 24′ 10″;" and for "89° 7′ 36″" read "87° 7′ 36″."

THE WEATHER OF THE MONTH.

By Mr. W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart IV and the average values and departures from normal are shown in Tables I and VI.

The mean barometric pressure was high over the eastern half of the country and on the north Pacific coast, with the highest reading 30.05 inches in southwestern Washington. The readings were low over the middle and southern Plateau regions, with a minimum mean of 29.72 inches at Yuma.

The mean pressure was above the normal in New England, the eastern parts of Pennsylvania and New York, western Kentucky, southern Tennessee, parts of the Gulf States, lower Missouri and upper Mississippi valleys, parts of the northern and middle slope regions, eastern North Dakota, northwestern part of the upper Lake region, and on the immediate coast of Washington, Oregon, and northern California; elsewhere the mean pressure was below the normal.

The pressure diminished from that of July, 1903, in the Pacific States, the Plateau regions generally, the Gulf and South Atlantic States, central Mississippi Valley, and the Ohio Valley and Tennessee.

TEMPERATURE OF THE AIR.

The distribution of maximum, minimum, and average surface temperatures is graphically shown by the lines on Chart VI.

The mean temperature was above the normal in the middle Plateau and slope regions, generally over the southern half of the country, excepting on the Pacific coast and in portions of southeastern Texas. Over North Carolina, southeastern Tennessee, northwestern Texas, New Mexico, eastern Arizona, north-central Utah, and north-central Colorado the departures averaged between +2.0° and +3.5° per day. As a rule the departures in the region where the temperature was below the mean were more marked than the plus departures, averaging from −2.0° to −6.4° per day from Montana, South Dakota, and Nebraska eastward to the Atlantic Ocean. The greatest deficiencies in temperature were reported from New England, eastern New York, and about western Lake Superior.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	62.4	− 4.4	+ 4.4	+ 0.6
Middle Atlantic	12	70.9	− 2.4	+ 7.8	+ 1.0
South Atlantic	10	79.6	+ 1.7	+ 4.7	+ 0.6
Florida Peninsula *	8	82.9	+ 1.5	+ 6.0	+ 0.8
East Gulf	9	81.0	+ 1.5	− 6.7	− 0.8
West Gulf	7	80.9	+ 0.3	−10.2	− 1.3
Ohio Valley and Tennessee	11	75.4	+ 0.5	+ 3.2	+ 0.4
Lower Lake	8	66.8	− 2.6	+ 7.7	+ 1.0
Upper Lake	10	63.0	− 3.0	+10.9	+ 1.4
North Dakota *	8	63.9	− 2.5	+ 2.0	+ 0.2
Upper Mississippi Valley	11	71.0	− 1.7	+ 5.0	+ 0.6
Missouri Valley	11	71.8	− 1.2	+ 1.9	+ 0.2
Northern Slope	7	67.5	− 0.3	− 1.1	− 0.1
Middle Slope	6	75.5	+ 0.9	− 4.9	− 0.6
Southern Slope *	6	80.3	+ 1.6	− 9.0	− 1.1
Southern Plateau *	13	77.4	+ 0.7	−11.3	− 1.4
Middle Plateau *	8	69.9	− 0.4	−20.6	− 2.6
Northern Plateau *	12	67.4	− 0.4	+ 1.7	+ 0.2
North Pacific	7	60.8	− 0.6	− 3.5	− 0.4
Middle Pacific	5	63.4	− 1.3	− 8.6	− 1.1
South Pacific	4	70.9	− 0.6	− 5.5	− 0.7

* Regular Weather Bureau and selected voluntary stations.

In Canada.—Prof. R. F. Stupart says:

The temperature was below the average throughout the Dominion from the Pacific to the Atlantic oceans. The largest negative departures, amounting to from 3° to 6°, were recorded in Ontario and Quebec. In the Maritime Provinces they were from 3° to 4° below, British Columbia and the Northwest Territories from 2° to 4° below, and in Manitoba, Lake Superior, and the northern portions of Ontario from 1° to 2° below.

By geographic districts the temperature was above the normal in the South Atlantic and Gulf States, Florida Peninsula, Ohio Valley and Tennessee, and the middle and southern slope and southern Plateau regions; and below normal in the remaining districts. Generally the minus departures were quite marked.

The isotherm of 80° of mean temperature is located slightly to the northward of its position in August, 1902, while the isotherm of 70° is located somewhat to the southward of its August, 1902, position, with its southward trend over the slope regions about the same position.

Maximum temperatures of 100°, or higher, were reported from portions of the Carolinas, Georgia, Texas, Indian Territory, Kansas, New Mexico, Arizona, California, Nevada, Utah, Colorado, South Dakota, Montana, Idaho, Washington, and Oregon; and 110°, or higher, from western Arizona, extreme southern Nevada, and southeastern California.

Minimum temperatures of 32°, or lower, occurred in north-central Colorado and south-central and western Wyoming.

PRECIPITATION.

The distribution of total monthly precipitation is shown on Chart III.

Excepting in New England, the precipitation was in excess in the northern part of the country generally, in the Missouri and central Mississippi valleys, and parts of the South Atlantic and Gulf States, the most marked departures occurring in the lower Missouri Valley, southeastern North Carolina, and west-central Wisconsin, where they ranged from +4.0 inches to +9.2 inches.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	8	3.40	87	−0.5	+0.4
Middle Atlantic	12	5.97	131	+1.4	+1.7
South Atlantic	10	7.45	116	+1.0	+0.8
Florida Peninsula*	8	6.20	89	−0.8	+4.6
East Gulf	9	4.36	80	−1.1	−0.5
West Gulf	7	2.99	83	−0.6	+2.3
Ohio Valley and Tennessee	11	2.80	80	−0.7	−3.0
Lower Lake	8	4.56	154	+1.6	+3.3
Upper Lake	10	4.60	153	+1.6	+0.9
North Dakota*	8	4.94	166	+0.3	−3.3
Upper Mississippi Valley	11	4.93	163	+1.9	+0.4
Missouri Valley	11	6.14	202	+3.1	+3.3
Northern Slope	7	1.85	148	+0.6	+0.6
Middle Slope	6	2.73	112	+0.3	+0.7
Southern Slope*	6	3.05	130	+0.7	−1.3
Southern Plateau*	13	1.08	78	−0.3	0.0
Middle Plateau*	8	0.11	22	−0.4	−0.4
Northern Plateau*	12	1.10	220	+0.6	−3.0
North Pacific	7	0.88	100	0.0	−6.7
Middle Pacific	5	0.10	100	0.0	−3.7
South Pacific	4	T.	100	0.0	+0.4

*Regular Weather Bureau and selected voluntary stations.

In Canada.—Professor Stupart says:

The rainfall was below the average over western Quebec, the greater portion of the Maritime Provinces, and from eastern Manitoba to and over the Lake Superior district; elsewhere it was above the average, except locally in northern Saskatchewan, the positive departures being exceptional in many localities. In British Columbia, Barkerville recorded 3.4 inches above the average; in the Northwest Territories, Calgary was 5.3 inches above, Qu'Appelle 3.6 inches above, and Edmonton 2.1 inches above. The Peninsula of Ontario was also remarkable for its heavy rainfall, Stony Creek was 4.8 inches above the average, Port Hope 3.3 inches above, Goderich 2.9 inches above, Georgetown 2.8 inches above, Port Dover 2.7 inches above, and Stratford 2.9 inches above. The largest negative departure was reported from St. John, 2.5 inches, and Sydney came next with 2 inches.

By geographic districts the precipitation was normal in the Pacific districts; below normal in New England, Florida Peninsula, Gulf States, Ohio Valley and Tennessee, and the southern and middle Plateau regions, with generally slight deficiencies. In the remaining districts the precipitation was above the normal, with a marked excess in the Missouri Valley.

Rainfall exceeding 10 inches in amount occurred in the eastern portions of the Carolinas, north-central Florida, the eastern parts of Kansas and Nebraska, and southwestern Iowa.

The only rains reported from California were in the extreme southern and extreme northern portions.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 1, 29. Arizona, 5, 8, 9, 16, 26. Arkansas, 9. Colorado, 5, 6, 8, 9, 10, 11, 14, 15, 19, 20, 22, 23, 24, 26, 28. Georgia, 31. Idaho, 21. Illinois, 5, 8, 9, 15, 19, 20. Indiana, 3, 19, 25, 29. Iowa, 3, 4, 5, 8, 9, 10, 14, 18, 26, 28. Kansas, 1, 2, 5, 6, 7, 8, 11, 12, 24, 25, 31. Kentucky, 17, 19. Louisiana, 25. Maine, 16, 17, 23. Maryland, 25, 27, 28. Massachusetts, 16. Michigan, 8, 10, 11, 18, 19, 21, 23. Minnesota, 2, 4, 5, 9, 17, 31. Mississippi, 29. Missouri, 5, 8, 10, 12, 13, 26, 27, 28. Montana, 1, 2, 3, 7, 10, 11, 13, 15, 16, 24. Nebraska, 1, 2, 7, 11, 12, 13, 14, 15, 17, 18, 19, 22, 24, 25. New Hampshire, 17. New Jersey, 25. New Mexico, 3, 5, 9. New York, 6, 9, 11, 17, 19, 20, 24, 25, 31. North Carolina, 8, 15, 16, 26, 29, 30. North Dakota, 2, 4, 13, 17, 22, 23, 31. Ohio, 6, 19, 26, 29. Oklahoma, 8, 9. Oregon, 22. Pennsylvania, 6, 11, 19, 25, 30. South Dakota, 4, 5, 7, 18, 21, 23, 26. Tennessee, 6, 10, 17, 19. Texas, 28. Utah, 7, 8, 9, 10, 12, 13, 16, 24, 26. Virginia, 4, 29. Washington, 22. West Virginia, 11, 18, 19. Wisconsin, 5, 8, 23. Wyoming, 2, 5, 8, 9, 10, 20, 23, 24, 26.

HUMIDITY.

The relative humidity was normal in the South Atlantic States, and the southern Plateau and south Pacific regions; slightly below normal in New England, the Florida Peninsula, and the southern Plateau and middle Pacific districts. In the remaining districts it was above normal, markedly so in North Dakota, and the southern slope region, where the excess amounted to + 10 and + 12 per cent, respectively.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	81	− 1	Missouri Valley	74	+ 7
Middle Atlantic	81	+ 5	Northern Slope	64	+12
South Atlantic	82	0	Middle Slope	64	+ 5
Florida Peninsula	78	− 2	Southern Slope	61	0
East Gulf	81	+ 1	Southern Plateau	40	− 1
West Gulf	78	+ 3	Middle Plateau	35	+ 2
Ohio Valley and Tennessee	74	+ 2	Northern Plateau	44	+ 1
Lower Lake	75	+ 4	North Pacific	78	+ 1
Upper Lake	78	+ 3	Middle Pacific	66	− 1
North Dakota	74	+10	South Pacific	66	0
Upper Mississippi Valley	76	+ 6			

SUNSHINE AND CLOUDINESS.

The cloudiness was above the average in New England, the Middle Atlantic and east Gulf States, Ohio Valley and Tennessee, Lake region, North Dakota, upper Mississippi, and Missouri valleys, and the north and middle Pacific districts; elsewhere it was below the average, except in the middle slope region, where it was normal.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographic districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the following table:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.7	+ 0.7	Missouri Valley	4.8	+ 0.7
Middle Atlantic	6.1	+ 1.1	Northern Slope	3.6	— 0.1
South Atlantic	4.9	— 0.3	Middle Slope	3.8	0.0
Florida Peninsula	4.5	— 0.7	Southern Slope	4.3	— 0.5
East Gulf	5.3	+ 0.4	Southern Plateau	3.1	— 0.3
West Gulf	4.0	— 0.4	Middle Plateau	1.6	— 0.6
Ohio Valley and Tennessee	4.6	+ 0.1	Northern Plateau	2.3	— 0.7
Lower Lake	5.5	+ 1.0	North Pacific	6.0	+ 1.9
Upper Lake	6.1	+ 1.3	Middle Pacific	3.3	+ 0.5
North Dakota	5.1	+ 1.2	South Pacific	1.8	— 0.7
Upper Mississippi Valley	5.1	+ 1.0			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 7174 thunderstorms were received during the current month as against 6524 in 1902 and 8139 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country was most numerous were: 25th, 427; 5th, 388; 9th, 326; 6th, 316.

Reports were most numerous from: Missouri, 525; Nebraska, 404; Iowa, 374; Florida, 323.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: 4th to 12th.

In Canada: Thunderstorms were reported at St. John, N. B., 17, 22. St. Johns, N. F., 2. Grand Manan, 22. Yarmouth, 31. Charlottetown, 15, 23. Father Point, 12, 22. Quebec, 11, 16, 17, 19, 22. Montreal, 6, 11, 20. Toronto, 6, 11, 25. White River, 5, 8, 18, 19, 21, 22. Port Stanley, 24, 25, 29. Saugeen, 8, 25. Parry Sound, 11, 21. Port Arthur, 5. Winnipeg, 5, 14, 15, 16, 17, 18, 20. Minnedosa, 3, 17. Qu'Appelle, 4, 17. Medicine Hat, 4, 11, 15, 16, 22. Swift Current, 7, 8, 23. Calgary, 3, 9. Banff, 9. Edmonton, 31. Barkerville, 19. Hamilton, Bermuda, 19, 22, 27.

Auroras were reported from St. John, N. B., Sidney, Grand Manan, Yarmouth, Charlottetown, Port Stanley, Port Arthur, and Edmonton on the 21st; from Quebec on the 21st, 23d, and 26th, and from Swift Current on the 14th and 21st.

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Block Island, R. I	5	54	e.	Mount Tamalpais, Cal.	21	62	nw.
Do	29	52	e.	Do	22	66	nw.
Buffalo, N. Y	25	58	w.	Do	25	60	nw.
Cairo, Ill	5	60	n.	New York, N. Y	25	56	nw.
Chicago, Ill	5	56	sw.	Point Reyes Light, Cal.	2	65	nw.
Do	15	51	se.	Do	5	58	nw.
Cleveland, Ohio	29	54	nw.	Do	20	50	nw.
Jacksonville, Fla	5	55	w.	Do	22	60	nw.
Knoxville, Tenn	10	70	nw.	Do	24	55	nw.
Minneapolis, Minn	5	60	nw.	Do	25	54	nw.
Mount Tamalpais, Cal	2	55	nw.	Do	26	50	nw.
Do	15	60	nw.	Sand Key, Fla	1	52	se.
Do	18	55	nw.	Do	12	62	se.
Do	19	60	nw.	Springfield, Mo	8	67	n.

DESCRIPTION OF TABLES AND CHARTS.

By Mr. W. B. STOCKMAN, Forecast Official, in charge of Division of Meteorological Records.

For description of tables and charts see page 286 of REVIEW for June, 1903.

TABLE 1.—*Climatological data for Weather Bureau stations, August, 1903.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.					Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.					
New England.							**62.4**	**— 4.4**											**81**	**3.40**	**— 0.5**										
Eastport	76	69	82	29.91	29.99	+ .03	58.0	— 2.6	73	22	65	47	25	51	21	54	51	83	1.14	— 2.3	11	5,995	s.	42	ne.	31	10	13	8	5.2	
Portland, Me.	103	81	117	29.89	30.01	+ .03	61.5	— 5.3	82	22	68	50	28	54	23	57	53	77	1.85	— 1.9	10	6,011	se.	23	s.	19	12	9	10	5.3	
Concord	298	70	79	29.69	30.01	+ .03	61.1	— 6.4	82	22	71	45	14	51	29	....	....	....	3.38	— 0.3	15	3,180	n.	20	nw.	17	8	12	11	6.2	
Northfield	876	16	60	29.08	30.03	+ .05	57.4	— 5.5	79	22	68	37	8	47	32	54	51	80	2.94	— 1.0	13	4,965	s.	26	nw.	22	6	13	12	6.5	
Boston	125	115	181	29.88	30.01	+ .02	65.0	— 4.1	86	22	72	52	8	58	23	60	57	77	3.33	— 1.1	11	6,429	w.	30	ne.	30	11	10	10	5.5	
Nantucket	12	43	85	30.00	30.01	+ .02	64.2	— 3.5	77	23	69	55	4	59	15	61	59	86	2.09	— 1.1	13	8,260	sw.	46	e.	5	3	18	10	6.2	
Block Island	26	11	60	29.99	30.02	+ .03	64.8	— 3.2	78	23	70	53	8	59	16	61	60	86	4.33	+ 0.9	14	9,778	sw.	54	e.	5	10	10	11	5.5	
Narragansett	....	10	38	....	....	....	64.2	— 4.2	81	23	72	52	14	57	25	....	....	....	4.55	+ 0.7	14	....	sw.	....	....	....	....	16	3	12	....	
New Haven	106	117	140	29.90	30.01	+ .02	65.4	— 4.6	86	23	73	52	8	58	25	60	57	79	6.96	+ 1.8	13	5,462	n.	30	e.	5	12	8	11	5.0	
Mid. Atlantic States.							**70.9**	**— 2.4**											**81**	**5.97**	**+ 1.4**										**6.1**
Albany	97	102	115	29.91	30.01	+ .03	64.8	— 5.7	85	22	73	48	8	56	28	59	56	79	5.14	+ 1.1	15	4,091	s.	25	s.	19	6	8	17	6.9	
Binghamton	875	79	90	29.08	30.00	+ .01	63.2	— 4.0	88	25	72	41	8	54	32	....	....	....	6.85	+ 2.9	15	3,583	e.	32	nw.	25	3	18	10	6.7	
New York	314	108	350	29.67	30.00	.00	69.2	— 3.1	88	25	75	56	8	64	20	63	60	77	5.96	+ 1.3	17	7,245	nw.	56	nw.	25	7	9	15	6.7	
Harrisburg	374	94	104	29.60	29.99	— .02	68.6	— 3.5	92	25	76	53	8	62	26	63	60	80	5.82	+ 1.3	18	3,708	e.	30	nw.	25	3	14	14	7.0	
Philadelphia	117	168	184	29.88	30.01	+ .01	71.0	— 2.8	94	25	78	57	30	64	27	65	62	78	5.57	+ 1.2	17	5,234	s.	20	nw.	26	5	9	17	6.9	
Scranton	805	111	119	29.16	30.01	+ .01	65.4	....	90	25	74	44	8	57	28	60	58	79	6.03	....	17	4,426	ne.	40	n.	25	3	14	14	7.2	
Atlantic City	52	39	48	29.94	29.99	— .01	70.5	— 1.3	92	25	76	59	8	66	20	67	66	87	7.02	+ 2.2	12	5,687	ne.	30	se.	28	7	13	11	5.7	
Cape May	17	47	51	29.99	30.01	+ .01	71.1	— 2.1	90	25	76	58	8	66	17	67	....	....	6.70	+ 1.9	16	5,013	e.	36	n.	25	9	13	9	5.3	
Baltimore	123	69	117	29.86	29.98	— .03	71.9	— 3.0	97	25	79	58	8	65	26	67	64	78	5.85	+ 1.8	14	4,731	ne.	24	se.	27	4	11	16	6.8	
Washington	112	59	76	29.87	29.99	— .02	71.8	— 2.8	96	25	79	54	8	64	28	67	65	83	4.52	+ 0.5	14	3,608	ne.	26	nw.	6	8	9	14	6.3	
Cape Henry	18	11	58	29.94	29.96	— .04	76.8	+ 0.4	98	25	82	67	30	72	22	....	....	....	4.34	— 1.2	12	.....	e.	42	nw.	11	....	....	....	....	
Lynchburg	681	83	88	29.25	29.97	— .05	74.2	— 1.1	95	25	82	58	8	66	25	68	66	82	6.21	+ 2.2	15	2,357	ne.	24	nw.	11	10	12	9	5.2	
Norfolk	91	102	111	29.88	29.97	— .03	77.2	+ 0.6	97	25	84	66	2	71	23	72	70	83	7.68	+ 1.6	11	5,290	ne.	30	nw.	11	9	15	7	5.3	
Richmond	144	82	90	29.84	29.99	— .02	75.8	.....	98	25	84	63	1	68	29	....	....	....	3.21	.....	13	3,301	n.	18	sw.	30	7	15	9	5.7	
Wytheville	2,293	40	47	27.67	30.02	+ .01	70.8	.....	90	25	81	53	8	61	30	65	63	84	3.69	.....	13	2,997	w.	18	s.	29	12	16	3	4.2	
S. Atlantic States.							**79.6**	**+ 1.7**											**82**	**7.45**	**+ 1.0**										**4.9**
Asheville	2,255	53	75	27.72	30.00	— .02	72.6	+ 2.0	89	27	82	59	21	63	26	66	64	84	3.12	— 1.5	14	3,560	nw.	29	nw.	29	11	16	4	4.5	
Charlotte	773	68	76	29.17	29.99	— .03	78.8	+ 2.7	96	29	88	64	2	70	26	70	68	78	4.55	— 0.8	13	3,343	ne.	30	sw.	5	15	7	9	4.5	
Hatteras	11	12	47	29.97	29.98	— .02	79.5	+ 2.1	91	29	85	69	15	74	16	75	74	87	7.13	+ 0.8	13	8,243	sw.	38	nw.	6	16	11	4	4.3	
Kittyhawk	8	12	30	.....	.....	.....	78.5	+ 0.9	95	25	84	68	•	73	18	....	....	....	8.10	+ 1.3	11	8,717	sw.	.....	.....	.....	19	6	6	3.4	
Raleigh	376	93	101	29.58	29.97	— .04	78.3	+ 2.6	99	25	87	63	2	69	27	71	69	82	3.60	— 2.6	3	3,611	ne.	23	sw.	6	9	13	9	5.2	
Wilmington	78	82	90	29.88	29.95	— .05	79.8	+ 1.6	97	28	88	66	31	72	27	74	73	86	14.35	+ 6.9	18	4,769	sw.	42	nw.	30	10	12	9	5.3	
Charleston	48	14	92	29.94	29.99	— .02	82.0	+ 1.5	98	28	89	70	31	75	18	75	74	82	10.83	+ 3.2	14	6,354	sw.	30	se.	18	9	16	6	5.2	
Columbia, S. C.	351	114	122	29.61	29.98	— .03	80.5	+ 0.7	97	25	90	68	22	72	22	73	71	81	9.47	+ 2.6	16	4,083	e.	25	n.	8	8	12	11	5.7	
Augusta	180	89	97	29.78	29.97	— .04	81.2	+ 1.8	98	26	90	67	4	72	23	73	71	78	8.98	+ 3.8	13	3,275	se.	32	ne.	4	10	19	2	4.0	
Savannah	65	79	89	29.92	29.98	— .03	82.1	+ 1.8	99	28	90	70	31	74	22	75	73	82	5.17	— 2.6	15	4,644	sw.	30	n.	3	8	13	10	5.5	
Jacksonville	43	101	129	29.93	29.98	— .03	82.0	+ 0.9	97	29	90	69	12	74	28	75	73	84	6.60	+ 0.1	22	6,156	sw.	55	w.	5	5	19	7	5.8	
Florida Peninsula.							**83.3**	**+ 1.1**											**78**	**4.24**	**— 2.1**										**4.5**
Jupiter	28	10	48	29.98	30.01	+ .01	82.9	+ 1.9	96	29	90	69	2	76	20	75	75	80	2.47	— 3.1	14	6,525	se.	48	se.	1	7	23	1	4.5	
Key West	22	10	53	29.96	29.98	.00	84.0	+ 0.1	93	11	90	72	12	78	15	77	74	74	4.24	— 0.5	10	5,183	se.	34	e.	12	14	15	2	4.2	
Sand Key	24	....	....	29.95	29.98	.....	83.5	.....	93	29	88	71	2	79	14	....	....	....	3.76	.....	13	8,531	se.	62	se.	12	9	17	5	4.8	
Tampa	34	60	67	29.96	29.99	— .01	82.6	+ 1.2	95	15	90	69	4	75	24	76	74	81	6.00	— 2.8	19	3,754	w.	30	e.	4	11	16	4	4.6	
East Gulf States.							**81.0**	**+ 1.5**											**81**	**4.36**	**— 1.1**										**5.3**
Atlanta	1,174	190	216	28.78	30.00	— .01	78.2	+ 1.7	93	27	86	63	31	70	29	71	68	80	1.91	— 2.8	10	6,623	nw.	40	nw.	29	6	18	7	5.7	
Macon	370	93	99	29.60	29.99	— .02	81.3	.....	96	27	90	70	10	72	22	....	....	....	4.57	.....	13	3,009	w.	18	e.	2	11	14	6	4.5	
Pensacola	56	79	96	29.93	29.99	+ .01	82.4	+ 2.0	94	29	89	70	7	76	19	....	....	....	2.73	— 5.6	12	5,137	nw.	45	w.	7	7	21	3	4.8	
Mobile	57	88	96	29.93	29.99	+ .01	81.4	+ 1.1	94	17	89	70	7	74	22	74	72	82	6.37	— 0.5	13	4,218	w.	28	w.	10	5	22	4	5.9	
Montgomery	223	100	112	29.75	29.97	— .02	81.4	+ 1.6	97	27	90	68	31	73	23	74	72	87	4.57	+ 0.4	13	3,822	w.	29	se.	2	9	13	9	5.5	
Meridian	375	84	93	29.60	29.99	+ .01	79.6	+ 1.8	93	28	89	62	31	70	22	....	....	....	4.61	+ 0.2	13	2,938	w.	23	sw.	1	12	14	5	4.8	
Vicksburg	247	62	74	29.72	29.97	— .01	80.7	+ 0.6	93	2	89	65	31	72	23	74	72	84	2.82	— 0.7	9	3,789	sw.	35	sw.	24	11	12	8	4.9	
New Orleans	51	88	121	29.94	29.98	.00	83.0	+ 1.5	94	29	90	69	30	76	23	75	73	80	7.48	+ 1.4	16	4,558	w.	24	n.	29	3	18	10	6.4	
West Gulf States.							**80.9**	**+ 0.3**											**78**	**2.99**	**— 0.6**										**4.0**
Shreveport	249	77	84	29.72	29.98	+ .01	82.0	+ 0.7	96	16	91	70	31	73	23	74	71	78	3.06	+ 0.9	11	3,805	se.	30	nw.	17	18	11	2	3.4	
Fort Smith	457	79	94	29.49	29.96	— .01	79.2	+ 1.5	94	16	89	62	30	70	26	72	69	77	4.15	+ 0.4	10	4,489	e.	40	nw.	13	8	22	1	4.1	
Little Rock	357	93	100	29.61	29.98	.00	79.0	+ 0.8	92	24	88	64	30	70	24	72	69	76	4.69	+ 0.6	10	4,254	sw.	34	ne.	12	14	15	2	3.5	
Corpus Christi	20	48	53	29.94	29.97	+ .04	82.1	+ 0.7	92	18	88	70	18	76	22	76	74	81	1.84	— 1.2	11	7,381	se.	36	n.	18	16	13	2	3.7	
Fort Worth	670	106	114	29.26	29.96	+ .02	82.1	.....	100	16	92	68	21	72	26	....	....	....	1.57	.....	6	7,632	s.	30	sw.	9	22	9	0	2.5	
Galveston	54	106	112	29.90	29.96	.00	82.0	— 1.2	91	17	87	69	14	78	18	76	74	79	5.45	— 0.1	13	6,781	s.	32	se.	24	13	16	2	3.9	
Palestine	510	73	79	29.46	29.98	+ .01	80.8	+ 0.4	95	17	89	67	31	72	20	74	72	82	1.56	— 1.1	10	4,600	s.	24	s.	10	6	21	4	5.1	
San Antonio	701	80	91	29.24	29.95	+ .02	81.2	— 1.0	96	17	91	69	21	72	25	73	70	76	0.20	— 3.6	7	4,566	se.	31	n.	18	10	21	0	4.0	
Taylor	583	55	63	29.36	29.96	+ .01	80.4	.....	97	17	90	66	21	71	25	....	....	....	1.70	.....	4	5,080	s.	30	ne.	19	2	24	5	6.1	
Ohio Val. and Tenn.							**75.4**	**+ 0.5**											**74**	**2.80**	**— 0.7**										**4.6**
Chattanooga	762	106	112	29.21	30.01	+ .01	78.1	+ 2.2	94	24	88	61	31	68	24	70	67	75	3.15	— 0.6	11	4,129	w.	32	w.	6	13	15	3	4.6	
Knoxville	1,004	35	88	28.96	30.00	— .01	76.4	+ 1.6	92	24	87	61	31	66	25	69	67	80	3.86	— 0.2	15	4,026	sw.	70	nw.	10	13	14	4	3.9	
Memphis	397	146	154	29.58	30.00	+ .02	79.2	+ 0.5	92	4	87	62	31	72	20	73	72	83	1.55	— 2.1	6	5,332	sw.	36	e.	18	17	11	3	3.6	
Nashville	546	122	134	29.43	30.00	.00	78.9	+ 1.4	97	24	88	56	31	69	27	70	67	74	1.42	— 2.0	9	3,625	nw.	30	nw.	5	13	15	3	4.1	
Lexington	989	75	102	28.95	30.00	— .01	74.4	+ 0.4	93	24	84	56	31	65	24	....	....	....	1.49	— 2.0	9	5,642	sw.	42	nw.	2	13	12	6	4.7	
Louisville	525	114	136	29.43	30.01	+ .01	76.4	+ 0.1	96	24	86	60	1	67	26	67	63	70	3.51	0.0	10	4,488	n.	31	nw.	4	8	17	6	5.3	
Evansville	431	72	82	29.51	29.97	— .02	76.4	.....	94	24	85	56	31	68	25	....	....	....	4.54	.....	10	4,202	s.	27	nw.	5	10	18	3	4.2	
Indianapolis	822	154	164	29.12	30.00	.00	72.2	— 1.4	92	24	81	56	1	63	25	64	61	74	3.92	+ 0.6	12	6,102	s.	42	sw.	25	14	9	8	4.6	
Cincinnati	628	152	160	29.32	29.99	— .02	74.9	— 0.1	95	24	84	57	1	65	28	64	60	66	2.75	— 1.0	12	4,281	sw.	33	nw.	4	11	14	6	5.2	
Columbus	824	173	190	29.12	29.98	— .03	73.0	+ 0.7	95	25	84	54	1	62	28	62	57	65	0.67	— 2.6	8	7,130	sw.	40	sw.	5	10	15	6	4.9	
Pittsburg	842	116	123	29.09	29.97	— .04	72.2	— 0.6	94	25	81	54	8	63	28	63	59	69	4.71	+ 1.5	13	3,527	n.	30	nw.	28	10	16	5	4.7	
Parkersburg	638	77	84	29.32	29.99	— .02	74.1	+ 0.5	95	25	85	54	21	63	30	66	62	71	3.82	+ 0.5	5	3,311	sw.	30	nw.	25	15	14	2	3.7	
Elkins	1,940	41	50	28.00	29.99	— .03	68.4	.....	90	28	80	45	8	57	36	63	61	86	2.48	.....	16	2,023	w.	18	n.	6	2	22	7	6.2	
Lower Lake Region.							**66.8**	**— 2.6**											**75**	**4.56**	**+ 1.6**										**5.5**
Buffalo	767	178	206	29.15	29.97	— .02	66.2	— 2.3	80	19	72	53	7	60	21	60	57	73	5.29	+ 2.1	9	8,449	sw.	58	w.	25	2	16	13	7.1	
Oswego	335	76	91	29.61	29.97	— .02	63.0	— 5.2	82	18	70	48	8	57	25	59	56	78	3.08	+ 0.4	11	6,765	s.	25	se.	29	9	12	10	5.6	
Rochester	523	81	102	29.42	29.99	.00	65.3	— 3.1	85	18	74	48	8	57	26	59	55	75	3.48	+ 0.4	9	5,241	sw.	28	w.	11	6	13	12	6.3	
Syracuse	597	97	113	29.35	29.99	.00	63.3	.....	82	19	71	48	14	56	24	....	....	....	5.41	.....	13	7,412	s.	37	sw.	6	7	14	10	5.7	
Erie	713	92	102	29.22	29.97	— .04	67.0	— 2.5	85	19	73	51	8	61	23	62	59	76	3.28	0.0	11	6,408	n.	33	nw.	25	9	14	8	5.4	
Cleveland	762	190	201	29.17	29.98	— .03	67.8	— 1.8	85	25	74	50	8	61	26	62	58	74	4.13	+ 1.0	11	8,541	se.	54	nw.	29	8	15	8	5.5	
Sandusky	629	62	70	29.31	29.99	— .01	69.3	— 1.7	90	25	76	52	8	62	25	....	....	....	6.32	+ 3.2	14	5,265	ne.	27	nw.	4	15	13	3	3.2	
Toledo	628	120	127	29.31	29.99	— .01	68.7	— 2.1	88	25	77	49	7	60	25	62	58	73	6.65	+ 4.0	5	6,079	sw.	38	w.	4	12	11	8	4.9	
Detroit	730	153	193	29.19	29.98	— .03	67.4	— 2.3	84	5	75	47	7	60	22	62	59	78	4.27	+ 1.6	13	7,291	ne.	31	nw.	6	7	15	9	5.8	
Upper Lake Region.							**63.0**	**— 3.0**											**78**	**4.60**	**+ 1.6**										**6.1**
Alpena	609	63	80	29.33	30.00	.00	60.6	— 2.9	83	18	69	42	7	52	31	57	54	79	5.68	+ 2.2	15	7,259	se.	35	nw.	18	6	10	15	6.8	
Escanaba	612	40	48	29.32	29.98	— .01	60.7	— 3.9	89	21	69	43	9	53	30	57	54	80	4.97	+ 1.2	15	5,264	n.	31	se.	5	7	14	10	5.8	
Grand Rapids	707	127	165	29.22	29.98	— .01	65.6	— 4.6	85	3	74	47	7	57	25	60	58	79	4.83	+ 2.4	12	7,091	e.	39	sw.	21	10	11	10	5.5	
Houghton	668	66	74	29.27	29.99	+ .02	59.9	.....	82	21	68	44	12	52	25	....	....	....	2.03	.....	12	5,190	w.	28	w.	21	14	9	8	4.9	
Marquette	734	79	116	29.20	30.00	+ .01	59.8	— 3.8	87	21	65	49	23	54	25	55	52	76	4.68	+ 1.8	15	6,518	nw.	48	sw.	21	6	10	15	6.8	
Port Huron	638	70	120	29.31	30.00	.00	64.4	— 2.6	83	18	72	44	7	57	27	60	57	78	4.26	+ 1.7	12	6,758	ne.	42	w.	25	10	7	14	6.1	
Sault Ste. Marie	614	40	61	29.30	29.96	— .03	59.8	— 1.0	79	17	67	46	7	53	27	55	52	77	3.37	+ 0.6	12	5,293	nw.	32	sw.	21	7	11	13	6.4	
Chicago	823	241	274	29.11	29.99	— .01	68.4	— 2.5	92	24	74	55	11	63	22	62	59	75	3.49	+ 0.5	11	10,740	sw.	56	sw.	5	9	10	12	6.0	
Milwaukee	681	124	142	29.26	29.99	— .01	66.8	— 1.5	85	24	74	53	12	60	21	62	61	85	5.56	+ 2.8	15	7,819	ne.	36	s.	5	11	6	14	5.9	
Green Bay	617	49	86	29.32	29.99	.00	63.6	— 3.1	83	5	72	46	7	56	26	58	56	78	5.38	+ 2.8	13	7,036	ne.	43	sw.	21	3	10	18	7.3	
Duluth	702	95	116	29.23	30.00	+ .03	60.4	— 4.3	85	21	66	49	12	54	24	55	51	77	3.80	+ 0.5	14	7,725	ne.	38	ne.	28	8	13	10	6.0	

TABLE I.—*Climatological data for Weather Bureau stations, August, 1903*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.								Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max., + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
North Dakota.							**63.7**	**— 2.7**									**74**	**5.40**	**+ 3.8**									**5.1**	
Moorhead	935	54	60	28.97	29.98	+ .02	63.7	— 1.5	92	17	74	44	30	53	36	58	55	78	5.58	+ 2.9	13	6,264	se.	39	se.	17	11	8	12	5.6	
Bismarck	1,674	16	29	28.22	29.98	+ .04	64.7	— 2.8	95	17	76	41	10	54	36	57	53	73	5.59	+ 3.6	10	6,998	se.	38	se.	26	16	10	5	4.4	
Williston	1,875	14	44	27.97	29.92	— .01	62.8	— 3.7	95	20	75	37	10	50	43	56	51	72	5.02	+ 3.9	14	7,554	se.	46	ne.	22	11	10	10	5.3	
Upper Miss. Valley.							**71.0**	**— 1.7**									**76**	**4.93**	**+ 1.9**									**5.1**	
Minneapolis	.....	99	208	.....	.....	.....	65.1	— 4.0	88	21	72	48	30	58	24	.....	.....	.....	4.61	+ 1.4	12	8,174	nw.	60	nw.	5	6	14	11	.....	
St. Paul	837	102	122	29.07	29.97	.00	65.9	— 3.2	89	21	74	48	30	58	27	59	56	75	4.90	+ 1.6	13	4,964	nw.	36	nw.	5	11	9	11	5.5	
La Crosse	714	71	87	29.22	29.98	.00	66.6	— 3.5	85	2	74	50	7	59	27	.....	.....	.....	8.36	+ 5.1	14	4,532	s.	40	n.	5	3	16	12	6.8	
Davenport	606	71	79	29.31	29.94	— .04	70.7	— 2.1	94	23	79	53	31	62	25	64	61	76	4.68	+ 1.1	8	4,606	sw.	27	s.	5	11	19	11	5.4	
Des Moines	861	84	99	29.07	29.98	+ .01	70.2	— 1.8	92	23	79	50	31	61	27	64	61	78	6.72	+ 3.5	13	4,985	sw.	30	w.	24	5	15	11	6.2	
Dubuque	698	100	117	29.23	29.98	.00	68.4	— 3.2	90	24	77	51	7	60	27	62	60	78	5.27	+ 2.1	14	4,360	nw.	24	nw.	8	10	12	9	5.3	
Keokuk	614	63	78	29.30	29.94	— .04	73.6	— 0.9	96	23	83	52	31	64	27	65	62	75	4.80	+ 2.0	9	4,774	sw.	30	nw.	28	10	16	5	4.5	
Cairo	356	87	93	29.61	29.98	— .01	77.4	+ 0.4	93	24	86	57	31	69	23	71	69	80	0.81	— 2.0	11	4,932	sw.	60	n.	5	10	19	2	4.4	
Springfield, Ill.	644	82	93	29.30	29.98	— .01	73.1	— 0.3	94	24	82	55	31	64	27	65	62	75	2.92	+ 0.6	5	5,627	nw.	31	ne.	5	12	10	9	5.2	
Hannibal	534	75	110	29.40	29.96	— .02	74.1	— 0.1	95	23	84	52	31	65	30	.....	.....	.....	5.14	+ 2.9	12	5,681	sw.	42	nw.	5	20	11	0	2.7	
St. Louis	567	208	217	29.38	29.97	— .02	76.4	— 0.4	95	24	84	57	31	68	26	68	64	70	5.97	+ 2.5	12	6,460	sw.	47	n.	5	11	12	8	4.7	
Missouri Valley.							**71.8**	**— 1.2**									**74**	**6.14**	**+ 3.1**									**4.8**	
Columbia, Mo.	784	11	84	29.15	29.96	— .01	73.9	— 2.1	94	23	84	49	31	63	31	.....	.....	.....	5.09	+ 2.6	13	4,408	sw.	34	n.	5	6	13	12	5.9	
Kansas City	963	78	95	28.98	29.99	+ .02	75.0	— 0.7	96	5	83	54	31	67	22	67	64	75	6.40	+ 2.5	9	5,022	s.	32	nw.	12	11	14	6	4.4	
Springfield, Mo	1,324	98	104	28.61	29.98	+ .01	74.8	+ 0.8	92	26	84	53	31	66	24	68	65	76	4.49	+ 0.8	10	6,055	s.	67	n.	8	27	4	0	2.4	
Topeka	.....	81	89	.....	.....	.....	74.2	— 0.6	95	5	84	52	31	64	28	.....	.....	.....	12.69	+ 8.8	11	5,683	s.	36	n.	2	10	17	4	4.5	
Lincoln	1,189	75	84	28.69	29.92	— .03	71.5	— 2.1	92	23	80	52	31	63	24	65	63	79	6.45	+ 3.2	13	6,234	s.	45	sw.	24	12	10	9	4.9	
Omaha	1,105	115	121	28.79	29.95	— .01	71.6	— 2.1	92	23	80	54	31	64	23	65	62	76	12.50	+ 9.2	14	4,874	s.	35	sw.	24	9	13	9	5.7	
Valentine	2,598	47	54	27.24	29.91	— .03	69.7	— 0.6	96	20	81	49	30	59	39	61	57	69	4.21	+ 2.2	7	7,265	s.	36	s.	7	15	14	2	3.6	
Sioux City	1,135	96	164	28.75	29.94	— .01	69.2	— 2.4	90	4	78	47	31	61	28	.....	.....	.....	5.67	+ 2.5	13	6,850	se.	44	se.	1	7	13	11	6.3	
Pierre	1,572	43	50	28.29	29.93	— .01	71.0	— 1.8	102	20	82	48	30	60	38	62	58	69	3.98	+ 2.3	14	5,738	e.	35	ne.	23	8	15	8	5.6	
Huron	1,306	56	67	28.57	29.94	— .01	68.2	— 0.2	98	21	80	42	10	56	44	61	57	75	1.09	— 1.5	12	7,520	se.	33	ne.	17	12	7	12	5.4	
Yankton	1,233	42	49	28.64	29.94	— .01	70.3	— 1.5	92	4	80	49	31	60	32	.....	.....	.....	4.98	+ 1.9	12	4,016	e.	33	ne.	1	16	6	9	4.6	
Northern Slope.							**67.5**	**— 0.3**									**64**	**1.85**	**+ 0.6**									**5.6**	
Havre	2,505	46	53	27.34	29.95	+ .04	64.4	— 1.2	96	19	76	46	28	52	44	57	52	71	2.52	+ 1.1	12	6,179	e.	38	nw.	7	18	8	5	3.7	
Miles City	2,371	42	50	27.42	29.88	— .05	70.4	— 1.3	98	16	83	50	2	58	38	64	61	77	1.43	+ 0.4	8	4,463	e.	34	w.	27	21	8	2	2.9	
Helena	4,110	88	94	25.80	29.92	— .02	66.0	— 0.5	91	19	78	43	28	54	35	52	42	49	0.83	+ 0.2	8	5,567	sw.	35	sw.	15	23	5	3	2.6	
Kalispell	2,965	45	51	26.89	29.90	— .03	62.4	.....	90	19	76	40	30	48	39	51	44	60	0.78	.....	6	4,250	w.	17	sw.	29	21	7	3	2.9	
Rapid City	3,234	46	50	26.60	29.90	— .03	68.0	— 1.9	100	20	80	46	29	56	43	59	54	68	2.47	+ 1.2	12	5,424	w.	40	nw.	21	12	11	8	4.6	
Cheyenne	6,088	56	64	24.09	29.93	+ .01	66.1	+ 1.1	90	4	81	40	29	52	43	52	45	56	1.90	+ 0.3	18	4,871	nw.	33	sw.	24	13	13	5	4.4	
Lander	5,372	26	36	24.68	29.91	— .01	66.3	+ 1.4	93	20	85	36	27	48	47	52	42	52	0.19	— 0.4	2	2,581	sw.	34	s.	2	16	12	3	3.5	
North Platte	2,821	43	52	27.09	29.96	+ .02	71.6	+ 0.2	97	22	84	47	29	60	31	64	61	76	3.58	+ 1.2	12	5,434	se.	46	nw.	27	11	18	2	4.2	
Middle Slope.							**75.5**	**+ 0.9**									**64**	**2.73**	**+ 0.3**									**5.8**	
Denver	5,291	79	151	24.78	29.93	+ .01	72.3	+ 2.2	97	21	87	48	29	58	39	56	47	51	1.35	— 0.1	9	5,554	s.	42	w.	21	14	12	5	4.2	
Pueblo	4,685	80	86	25.32	29.91	.00	72.9	+ 0.6	98	4	88	49	28	58	41	58	49	53	1.98	— 0.1	8	4,992	se.	31	nw.	23	19	10	2	3.1	
Concordia	1,398	42	47	28.50	29.94	— .01	74.2	— 0.2	92	*	84	50	30	64	27	67	64	74	4.32	+ 1.6	9	5,085	s.	27	w.	26	7	21	3	4.6	
Dodge	2,509	44	54	27.38	29.93	.00	76.8	+ 1.6	103	5	89	54	29	64	34	65	61	66	2.21	— 0.6	11	8,592	s.	39	s.	15	16	12	3	3.6	
Wichita	1,358	78	86	28.56	29.97	+ .02	77.1	+ 0.6	97	5	87	56	30	67	29	69	65	75	4.46	+ 1.4	6	5,658	s.	28	n.	6	14	16	1	3.8	
Oklahoma	1,214	79	86	28.68	29.93	— .01	79.5	+ 0.5	97	16	90	61	31	70	29	69	65	68	2.07	— 0.6	9	8,090	s.	38	sw.	13	16	10	5	3.7	
Southern Slope.							**79.4**	**+ 2.8**									**61**	**3.17**	**+ 0.6**									**4.3**	
Abilene	1,738	45	54	28.16	29.92	.00	82.4	+ 2.2	101	17	93	63	21	72	30	69	63	59	1.67	— 1.0	3	6,779	se.	25	e.	2	11	15	5	4.6	
Amarillo	3,676	10	49	26.26	29.90	— .02	76.4	+ 3.5	96	5	88	59	21	64	33	64	58	63	4.67	+ 2.3	8	10,031	s.	37	e.	6	15	16	0	4.0	
Southern Plateau.							**79.3**	**+ 1.3**									**40**	**0.98**	**— 0.2**									**3.1**	
El Paso	3,762	10	110	26.15	29.81	— .03	80.1	+ 1.1	101	1	92	62	22	68	33	63	54	51	1.73	— 0.1	11	6,534	e.	46	se.	6	8	21	2	4.4	
Santa Fe	7,013	47	50	23.36	29.87	— .02	69.4	+ 3.1	89	5	80	52	24	59	29	53	42	45	1.18	— 1.4	7	4,679	se.	34	se.	14	15	14	2	3.5	
Flagstaff	6,907	12	25	23.44	29.86	+ .02	66.2	— 0.2	90	6	81	45	28	51	39	53	.....	.....	2.26	+ 0.8	14	.....	sw.	.....	.....	.....	7	17	7	5.3	
Phoenix	1,108	50	56	28.64	29.74	— .05	90.8	+ 2.6	111	20	103	67	8	78	34	69	58	37	0.70	— 0.2	4	3,616	e.	30	nw.	8	25	4	2	2.6	
Yuma	141	16	50	29.59	29.72	— .04	91.0	+ 0.3	113	16	104	72	2	78	36	73	64	48	T.	— 0.4	0	4,775	sw.	42	s.	20	29	2	0	0.6	
Independence	3,910	51	58	25.92	29.80	— .01	78.4	+ 0.8	99	19	92	59	26	65	30	54	30	19	0.00	— 0.2	0	5,533	se.	32	w.	13	23	8	0	2.1	
Middle Plateau.							**71.8**	**— 0.1**									**35**	**0.12**	**— 0.4**									**1.6**	
Carson City	4,720	82	92	25.27	29.88	+ .04	66.0	— 0.8	92	8	83	48	27	49	44	49	36	37	T.	— 0.1	0	5,141	w.	30	sw.	25	28	1	2	0.8	
Winnemucca	4,344	59	70	25.58	29.88	.00	67.6	— 3.0	96	18	86	34	26	49	47	53	42	43	0.05	0.0	1	5,582	sw.	32	w.	2	29	1	1	0.5	
Modena	5,479	10	43	24.63	29.85	— .01	71.6	.....	94	6	88	43	28	55	45	51	35	36	0.92	.....	7	9,034	sw.	44	sw.	25	22	9	0	1.7	
Salt Lake City	4,366	105	110	25.57	29.83	— .08	76.6	+ 2.0	98	19	90	48	27	64	33	55	37	28	0.43	— 0.3	5	4,614	se.	35	s.	25	22	9	0	2.0	
Grand Junction	4,608	43	51	25.36	29.86	— .04	76.9	+ 1.3	98	6	92	50	27	62	38	56	41	33	0.02	— 1.1	2	4,060	nw.	30	se.	25	19	11	1	3.1	
Northern Plateau.							**70.2**	**— 0.8**									**44**	**1.00**	**+ 0.7**									**2.3**	
Baker City	3,471	53	59	26.41	29.93	— .02	65.2	— 0.9	96	18	80	42	3	50	41	59	38	45	0.87	+ 0.7	2	3,930	s.	22	se.	6	23	5	3	2.4	
Boise	2,739	61	68	27.08	29.87	— .06	72.3	+ 0.1	104	18	88	48	4	56	43	54	39	36	0.13	— 0.1	2	2,328	nw.	13	w.	25	27	2	2	1.7	
Lewiston	757	52	61	29.08	29.87	— .08	73.4	— 1.2	108	18	88	51	3	59	46	.....	.....	.....	1.34	+ 0.8	4	2,845	e.	34	nw.	6	25	3	3	1.8	
Pocatello	4,482	46	54	25.45	29.85	— .07	71.1	+ 1.5	96	18	86	46	24	56	41	54	41	37	0.59	+ 0.2	4	6,086	e.	34	sw.	25	24	7	0	1.5	
Spokane	1,929	101	110	27.91	29.93	— .02	67.3	— 1.7	96	18	80	47	21	54	39	54	44	51	1.90	+ 1.6	7	4,046	s.	24	sw.	29	16	7	8	4.1	
Walla Walla	1,000	65	71	28.86	29.91	— .05	71.9	— 2.3	101	18	84	51	3	59	41	59	51	52	1.19	+ 1.0	3	3,905	s.	16	s.	29	27	3	1	2.1	
N. Pac. Coast Reg.							**60.8**	**— 0.6**									**78**	**0.98**	**0.0**									**6.0**	
North Head	211	11	56	29.82	30.05	+ .02	57.6	— 1.5	67	17	60	50	8	55	9	55	54	90	1.01	— 0.1	12	8,373	nw.	36	nw.	8	3	5	23	7.7	
Port Crescent	259	12	29	29.78	30.01	— .01	55.0	— 1.7	78	17	61	40	31	49	30	.....	.....	.....	1.49	+ 0.7	9	2,936	w.	12	e.	5	6	16	9	5.9	
Seattle	123	114	151	29.90	30.03	+ .03	63.2	— 1.1	84	18	71	52	30	56	26	57	52	72	0.50	0.0	3	3,763	w.	21	nw.	28	10	10	11	5.2	
Tacoma	213	113	120	29.79	30.00	— .02	62.3	+ 0.7	83	18	70	50	30	54	27	.....	.....	.....	0.75	0.0	6	3,338	n.	18	sw.	3	5	10	16	6.7	
Tatoosh Island	86	7	57	29.92	30.02	+ .02	55.2	— 0.6	67	18	59	48	10	51	14	54	53	96	1.33	— 1.1	14	7,403	sw.	34	e.	18	2	9	20	7.9	
Portland, Oreg.	154	68	96	29.84	29.99	— .02	66.0	+ 0.1	90	17	76	49	4	56	30	58	53	68	0.81	+ 0.3	6	3,250	nw.	18	sw.	5	12	7	12	5.3	
Roseburg	518	56	67	29.43	29.98	— .02	66.0	— 0.2	93	17	80	43	3	52	38	56	50	64	0.30	+ 0.1	3	3,013	nw.	18	n.	8	18	9	4	3.1	
Mid. Pac. Coast Reg.							**63.4**	**— 1.3**									**66**	**0.10**	**0.0**									**3.3**	
Eureka	62	62	80	29.96	30.02	+ .02	56.0	+ 0.1	66	16	60	48	31	52	14	53	51	86	0.53	+ 0.4	6	3,986	nw.	27	nw.	23	9	8	14	6.0	
Mount Tamalpais	2,375	11	18	27.50	29.94	+ .01	68.3	.....	91	7	77	46	10	60	32	52	39	39	T.	.....	0	12,246	nw.	66	nw.	22	28	3	0	0.6	
Red Bluff	332	50	56	29.49	29.84	— .02	78.2	— 2.9	108	8	94	56	15	63	40	59	44	35	0.00	0.0	0	3,087	se.	23	n.	23	29	2	0	0.6	
Sacramento	69	106	117	29.77	29.84	— .01	71.8	— 0.9	99	17	87	52	21	56	38	59	51	56	0.00	0.0	0	6,560	s.	26	s.	25	30	1	0	0.4	
San Francisco	155	161	167	29.78	29.96	+ .04	57.6	— 1.1	77	31	64	46	8	51	24	54	52	87	T.	0.0	0	9,982	w.	36	w.	2	16	11	4	3.6	
Point Reyes Light	490	7	50	29.38	29.90	.....	53.4	— 1.5	64	*	57	45	6	50	15	.....	.....	.....	0.00	— 0.2	0	17,778	nw.	65	nw.	2	5	11	15	6.5	
Southeast Farallon	30	9	17	29.91	29.93	.....	53.2	.....	60	15	55	49	28	52	6	52	52	95	T.	.....	0	12,861	nw.	48	nw.	2	11	13	7	5.3	
S. Pac. Coast Reg.							**70.9**	**— 0.6**									**66**	**T.**	**0.0**									**1.8**	
Fresno	330	67	70	29.48	29.82	.00	80.2	— 1.5	108	8	98	57	15	62	41	59	41	33	0.00	0.0	0	4,818	nw.	18	nw.	25	31	0	0	0.2	
Los Angeles	338	116	123	29.52	29.88	.00	70.6	+ 0.2	94	19	81	54	5	60	32	62	59	76	T.	0.0	0	3,778	w.	18	sw.	27	8	23	0	3.5	
San Diego	87	94	102	29.80	29.88	— .01	68.4	— 0.5	85	19	73	60	4	64	17	63	61	82	T.	— 0.1	0	4,034	nw.	20	nw.	29	26	4	1	1.8	
San Luis Obispo	201	46	48	29.72	29.93	— .01	64.4	— 0.4	94	16	78	44	3	51	44	56	52	73	0.00	0.0	0	2,817	w.	18	n.	22	30	1	0	1.9	
West Indies.																														
Basseterre	29	41	54	29.93	29.96	.00	81.2	.....	88	8	86	71	16	76	15	76	73	76	3.53	.....	16	7,548	e.	30	se.	16	11	10	10	5.4	
Bridgetown	30	57	65	29.89	29.92	.00	80.5	+ 1.5	88	7	86	71	20	75	15	76	74	81	7.27	+ 0.8	24	5,177	e.	28	se.	13	9	4	18	6.2	
Cienfuegos	52	62	67	29.91	29.95	.00	80.3	.....	95	10	90	69	17	71	23	74	73	82	2.84	.....	15	4,741	e.	32	e.	11	11	15	5	5.1	
Havana	57	87	105	29.92	29.98	+ .02	80.3	— 1.9	90	9	88	70	5	73	19	.....	.....	.....	3.93	— 2.1	13	7,479	e.	40	ne.	11	13	16	2	4.1	
Kingston	286	41	55	29.61	29.90	— .01	81.2	.....	95	11	88	72	24	75	22	.....	.....	.....	4.59	.....	10	.....	n.	.....	.....	.....	5	21	5	5.6	
Puerto Principe	352	55	62	29.62	29.99	+ .04	80.7	.....	95	9	90	69	31	71	24	75	74	87	3.61	.....	15	5,568	ne.	27	e.	13	8	20	3	4.8	
San Juan	82	48	90	29.89	29.96	— .01	80.6	— 0.8	89	6	87	71	22	75	15	76	74	79	8.41	+ 2.5	22	9,109	e.	48	se.	16	8	15	8	5.3	
Santiago de Cuba	82	46	52	29.87	29.95	.00	81.0	.....	94	10	90	69	14	72	19	74	72	78	2.12	.....	14	4,808	n.	26	se.	15	4	24	3	5.5	
Santo Domingo	57	37	44	29.92	29.99	+ .04	80.0	.....	92	9	87	70	30	73	17	75	73	85	9.93	.....	15	4,474	n.	23	se.	12	4	12	15	6.7	

* More than one date.

TABLE II.—*Climatological record of voluntary and other cooperating observers, August, 1903.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Anniston	96[f]	60[f]	79.4[f]	3.48	
Ashville	94	62	78.5	5.83	
Benton				4.76	
Bermuda	97[j]	65[j]	82.5[j]	3.75	
Birmingham	94	61	80.6	3.65	
Bridgeport				3.69	
Burkeville				3.40	
Calera				4.88	
Camphill				2.95	
Citronelle	95	67	81.0	2.23	
Clanton	99	64	81.2	1.67	
Cordova	98	60	80.6	1.64	
Daphne	97	70	82.6	3.17	
Decatur	98	59	79.6	4.49	
Demopolis				4.54	
Dothan	99	70	83.0	5.31	
Eufaula	93	69	80.7	5.05	
Evergreen	100	59	80.8	3.80	
Flomaton	96	68	80.6	6.65	
Florence *a*				0.68	
Florence *b*	99	54	79.8	1.00	
Fort Deposit	96	68	81.5	4.27	
Gadsden	100	62	81.1	2.62	
Goodwater	97	62	80.0	3.39	
Greensboro	95	59	81.0	4.09	
Haleysville	98	62	80.0	6.82	
Highland Home	95	62	79.2	3.28	
Letohatchie				4.33	
Livingston	96	63	81.1	2.50	
Lock No. 4	101	62[d]	81.0[b]	1.73	
Madison Station	100	57	81.4	3.65	
Maplegrove	100	54	79.6	1.10	
Marion	98	65	81.6	4.09	
Milstead				3.43	
Newbern	101	62	82.8	2.32	
Notasulga				1.83	
Oneonto	96	57	76.7	3.84	
Opelika	96	65	80.4	3.84	
Ozark	96	70	82.1	4.54	
Prattville	95	65	80.4	4.66	
Pushmataha	94	64	80.4	4.97	
Riverton	97	53	78.8	2.08	
Scottsboro	98	56	79.3	3.06	
Selma	97	70	82.6	2.95	
Talladega	98	62	81.0	4.30	
Tallassee				2.80	
Thomasville	99	64	80.2	9.62	
Tuscaloosa	98	63	81.5	4.57	
Tuscumbia	98	59	81.0	0.16	
Tuskegee	100	68	82.4	1.39	
Union Springs	99	68	81.8	2.16	
Uniontown	96	60	80.4	4.22	
Valleyhead	97	55	77.6	3.59	
Verbena				6.24	
Wetumpka	99	67	82.1	3.20	
Alaska.					
Killisnoo	72	41	55.8	2.30	
Mine Harbor	68	38	50.4	2.51	
Orca	76	42	57.2	10.75	
Sitka	79	42	57.6	3.90	
Arizona.					
Agua Caliente	114[e]	65[e]	93.0[e]	T.	
Allaire Ranch				3.73	
Arizona Canal Co's Dam	112	70	92.0	0.50	
Aztec	115	57	96.2	0.85	
Benson	104	56	80.7	2.06	
Bisbee	95[e]	60[e]	74.8[e]	6.28	
Bowie	105	63	81.8	2.53	
Buckeye	111	68	88.6	1.10	
Casagrande	115				
Champie Camp	114	48	81.0	2.50	
Cochise[*1]	110	60	75.2	2.00	
Congress	102	65	86.2	0.51	
Dragoon[*1]	95	65	78.8	1.88	
Dudleyville	107	63	84.6	2.86	
Duncan	104	39	78.2	4.06	
Fort Apache	99	48	72.8	3.00	
Fort Defiance	91[f]	41[e]	66.6[f]	4.03	
Fort Grant	100	60	80.0	3.10	
Fort Huachuca		61		3.62	
Fort Mohave	116	67	92.8	0.42	
Gilabend	118	68	91.8	0.40	
Greaterville	93	55	73.0	4.98	
Jerome	99	61	79.8	1.20	
Kingman	105	62	83.3	0.66	
Maricopa	111	70	91.9	0.52	
Mellen	115	73	95.2	0.04	
Mesa	113	69	90.8	0.46	
Mesa (near)	112	66	90.8	0.14	
Mohawk Summit[*1]	120	83	96.6	0.02	
Natural Bridge				1.57	
Nogales	100	60	79.2	3.67	
Oracle	96	62	78.4	2.73	
Oro				6.20	
Parker	120	70	94.2	0.12	
Phoenix	111	66	89.2	1.26	
Pinal Ranch				2.48	
Prescott	93	45	69.6	3.81	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
San Carlos	110			1.32	
San Simon	103	60	80.2	4.47	
Sentinel[*1]	114	82	97.5	0.25	
Signal	115	62	89.6	0.73	
Superstition				1.55	
Taylor	98	46	72.2	1.55	
Tombstone	101	62	78.0	2.22	
Tonto	108	58	85.0	2.04	
Tuba	104	53	76.0	T.	
Tucson	108	65	85.8	2.67	
Upper San Pedro	101	56	77.7		
Vail[*5]	101	70	83.6	0.19	
Walnutgrove				1.07	
Wilcox	103	50	74.1	0.84	
Yarnell				1.58	
Young	106	55	81.9	2.67	
Arkansas.					
Alco	98	53	78.4	2.62	
Amity	97	60	78.2	11.03	
Arkadelphia	97	61	80.0	5.75	
Arkansas City				2.64	
Batesville	95	58	79.2	1.27	
Beebranch	97	57	78.9	1.80	
Blanchard	95	63	79.8	3.58	
Brinkley	97	59	79.8	0.95	
Camden *a*				3.50	
Camden *b*	97	59	80.4	3.72	
Conway	95	60	79.8	5.52	
Corning	95	52	77.3	2.22	
Dallas	93	59	78.8	9.24	
Dardanelle				4.22	
De Queen	101	60	82.4	2.56	
Dodd City	96	50	76.2	3.40	
Dutton	88	54	73.4	4.88	
Eureka Springs	93	52	76.4	6.41	
Fayetteville				4.01	
Forrest City	95	59	79.8	4.40	
Fulton				2.65	
Hardy	99	52	78.7	1.70	
Helena *a*				4.04	
Helena *b*	95	61	79.8	3.58	
Jonesboro[*]	98	53	78.8		
Lacrosse	103[4]	55	79.6	1.68	
Lake Village	99	61	80.1	5.09	
Lonoke	98	57	79.2	3.09	
Lutherville	97	47	76.6	2.99	
Malvern	97	60	79.8	9.35	
Marvell	97	60	80.4	2.13	
Mossville	88	53	73.4	6.24	
Mount Nebo	86	58	74.4	7.25	
New Gascony	96	51	79.5	3.05	
Newport *a*				1.81	
Newport *b*	99	57	80.2	2.14	
Ozark	98	59	78.8	8.69	
Paragould	97	55	79.0	3.39	
Perry	95	58	78.8	5.57	
Pinebluff	98	60	80.4	5.41	
Pocahontas	102	56	80.0	2.96	
Pond	95	48	75.8	6.29	
Prescott	101	70	83.8	5.74	
Princeton	94	61	78.8	4.63	
Rison	97	51	77.4		
Rosadale	100	60	81.6	4.38	
Russellville	97	57	79.6		
Silversprings	96	52	76.6	5.34	
Stuttgart	97	60	79.4	3.07	
Texarkana	98	61	82.0	3.60	
Warren	100	59	81.2	4.37	
Washington	95	64	80.8	4.44	
Wiggs	93	52	76.4	7.65	
Winchester	97	59	80.2	3.40	
Winslow	87	52	72.4	6.43	
Witts Springs	96	53	75.6	3.26	
California.					
Angiola	109	51	78.6	0.00	
Azusa	104	51	75.0	0.00	
Bagdad	112	73	95.2	0.00	
Bakersfield	107	44	77.3	0.00	
Ballast Point L. H				0.00	
Barstow	109	55	83.4	T.	
Bear Valley				0.30	
Berkeley	79	49	60.7	0.00	
Bishop	97	45	72.0	0.00	
Boca[*1]	86	34	60.0	0.00	
Bodie	85	16	52.8	0.00	
Bowman	92	48	67.8	0.05	
Branscomb	102	35	64.2	0.02	
Caliente[*1]	102	70	86.6	0.00	
Campbell	91	41	63.5	0.00	
Campo				0.00	
Cape Mendocino L. H				0.05	
Cedarville	101	37	68.0	0.14	
Chico	106	50	75.6	0.00	
Cisco[*1]	80	47	66.1	0.00	
Claremont	106	50	76.2	0.00	
Cloverdale	105	44	72.6	0.00	
Colusa	102	54	75.0	0.00	
Corning[*1]	104	60	78.1	0.00	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Coronado	84	61	69.2	0.00	
Crescent City	76	39	56.8	0.92	
Crescent City L. H				0.96	
Cuyamaca	87	36	64.7	0.28	
Delano[*1]	106	67	82.6	0.00	
Delta[*5]	108	60	74.2	0.00	
Dunnigan[*5]	104	58	80.5	0.00	
Durham	110	50	75.6	0.00	
East Brother L. H				0.00	
Elcajon	101	52	73.0	0.00	
Elmdale	106	48	74.7	T.	
Escondido	104	47	70.4	0.00	
Fallbrook	100	51	73.0	0.00	
Fordyce Dam				0.08	
Fort Ross	72	44	56.6	0.00	
Foster				T.	
Georgetown	100	47	73.7	T.	
Gilroy (near)	98	43	66.2	0.00	
Greenville	103	44	73.0	0.00	
Hanford	107	52	77.6	0.00	
Healdsburg	106			0.00	
Hollister	96	41	65.8	0.00	
Humboldt L. H				0.52	
Idylwild	93	41	68.0	0.57	
Imperial	124	66	94.2	T.	
Iowa Hill[*1]	94	58	72.4	T.	
Irvine	100	60	75.4	0.00	
Jackson	98	54	75.4	T.	
Jamestown	102	50	73.8	T.	
Jolon				0.00	
Kennedy Gold Mine	94	45	68.0	0.00	
Kentfield	93	41	63.0	0.00	
Laguna Valley				0.45	
Lakeport (near)	96	56	73.8	0.00	
Laporte	87	38	61.0	0.01	
Legrande	108	50	77.2	0.00	
Lemoncove	107	55	80.5	0.00	
Lick Observatory	87	45	67.4	0.00	
Lime Point L. H				0.00	
Livermore	103	46	69.2	0.00	
Lodi	100	45	70.1	0.00	
Los Gatos	96	45	66.5	0.00	
Mammoth	115	68	92.4	T.	
Mare Island L. H				0.00	
Marysville	104	50	74.4	0.00	
Merced	106	56	80.4	0.00	
Mercury	106	40	68.8	0.00	
Mills College				0.00	
Milo				0.00	
Milton (near)	99	52	74.8	0.00	
Modesto[*1]	105	60	81.3	0.00	
Mohave	106	64	86.6	0.00	
Mokelumne Hill				T.	
Montague	100	41	70.2	0.05	
Monterio	102	50	73.9	0.00	
Monterey[*1]	72	52	60.4	0.00	
Mount St. Helena				0.00	
Napa	100	45	66.4	0.00	
Needles	112	79	97.1	0.27	
Nevada City	100	41	67.8	T.	
Newcastle	109	50	77.6	0.00	
Newman	111	49	78.2	T.	
Niles	92	44	65.2	T.	
North Bloomfield	100	44	70.8	0.02	
North San Juan	100	44	70.9	T.	
Oakland	81	50	62.7	0.00	
Ogilby[*5]	119	85	101.1	0.00	
Ontario	103	52	75.8	0.00	
Orland	107	52	78.6	T.	
Orleans	108	49	75.5	0.08	
Oroville (near)	106	53	75.4	0.00	
Palermo	106	48	74.0	T.	
Paso Robles	107	37	69.8	0.00	
Peachland[*5]	91	46	65.4	T.	
Piedras Blancas L. H				0.00	
Pigeon Point L. H				0.00	
Pilot Creek				T.	
Pine Crest	95	49	68.0	0.00	
Placerville	95	45	67.8	0.00	
Point Ano Nuevo L. H				0.00	
Point Arena L. H				0.00	
Point Bonita L. H				0.07	
Point Conception L. H				0.00	
Point Fermin L. H				0.00	
Point George L. H				0.15	
Point Hueneme L. H				0.00	
Point Lobos	68	47	55.6	0.00	
Point Loma L. H				0.00	
Point Montara L. H				0.00	
Point Pinos L. H				0.00	
Point Sur L. H				0.00	
Porterville	105	55	79.4	0.00	
Poway				T.	
Quincy	92	35	62.6	T.	
Ranch House	92	58	73.0	0.00	
Redding	104	56	78.5	0.00	
Redlands	107	51	78.4	0.21	
Reedley	108	53	79.3	0.00	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Represa	98	50	71.6	0.00	
Riovista	99	52	71.3	T.	
Riverside	105	49	74.2	T.	
Roe Island L. H.				0.00	
Rohnerville				0.35	
Rosewood	107	52	75.8	0.00	
Sacramento	95	51	69.8	0.00	
Salinas	88	40	61.9	0.00	
Salton	121	65	94.2	0.00	
San Bernardino	110	48	76.6	0.15	
San Jacinto	108	50	77.6	0.11	
San Jose	93	46	66.2	0.00	
San Leandro	86	46	63.1	0.00	
San Luis L. H.				0.00	
San Mateo *1	87	57	66.4	0.00	
San Miguel *1	102	50	72.5	0.00	
San Rafael	93	43	65.0	0.00	
Santa Barbara	87	52	66.1	0.00	
Santa Barbara L. H				0.00	
Santa Clara				0.00	
Santa Clara College	93	42	64.8	0.00	
Santa Cruz	92	40	62.0	0.00	
Santa Cruz L. H.				0.00	
Santa Maria	86	44	65.2	0.00	
Santa Monica	86	53	66.2	0.00	
Santa Paula	92	58	72.9	0.00	
Santa Rosa	97	40	64.8	T.	
Shasta	110	53	81.0	T.	
Sierra Madre	97	51	72.4	0.00	
Sisson	98	41	67.0	T.	
Sonoma				0.00	
S. E. Farallon L. H.				0.00	
Stockton	98	52	70.8	0.00	
Storey	105	50	76.6	0.00	
Summerdale	91	48	67.7	0.00	
Susanville	93	32	64.6	T.	
Tehama *1	102	64	81.2	0.00	
Tejon Ranch	102	62	81.6	0.00	
Trinidad L. H				0.00	
Truckee *1	90	30	53.7	0.00	
Tulare c	106	52	77.8	0.00	
Tustin	93	68	77.4	0.00	
Ukiah	111	40	69.8	0.00	
Upland	100	42	73.2	0.00	
Upperlake	105	41	70.6	0.00	
Upper Mattole *1	86	40	58.2	0.14	
Vacaville *1	104	60	74.4	0.00	
Ventura	84	49	65.0	0.00	
Visalia	105	51	77.0	0.00	
Volcano Springs	119	65	95.2	0.00	
Wasco	108	53	80.2	0.00	
Wheatland	101	52	73.8	0.00	
Williams *1	103	58	81.1	0.00	
Willits	106	44	69.6	0.00	
Willow	103	52	75.2	0.00	
Yerba Buena L. H.				0.00	
Zenia	94	39	63.6	0.07	
Colorado.					
Alford	91	39	64.3	1.98	
Antelope Springs	87	27	55.9	2.44	
Ashcroft	81	28	55.6	1.01	
Blaine	105	54	78.0	2.82	
Boulder	94	50	70.6	1.46	
Breckenridge	90	28	55.5	2.47	
Buenavista				0.24	
Canyon	98	42	70.4	5.30	
Castlerock	96	40	68.6	1.17	
Cedaredge	95	40	70.4	0.05	
Cheesman	93	43	66.3	3.04	
Cheyenne Wells	100	47	72.6	1.89	
Clearview	78	32	56.8	2.71	
Collbran	94	40	69.2	0.16	
Durango	93	41	67.8	1.87	
Floresta				0.64	
Fort Collins	95	42	67.6	0.86	
Fort Morgan	95	45	70.8	0.44	
Fox	100	44	72.3	0.81	
Fruita	100	43	73.8	0.16	
Garnett	85	31	60.0	0.48	
Gilman				1.02	
Gleneyre	95	39	66.4	2.97	
Glenwood Springs	93	28	64.2	0.39	
Greeley	99	43	70.8	0.93	
Grover				2.00	
Gunnison	87	28	59.6	0.37	
Hamps	93	43	67.6	1.40	
Hoehne	97	39	69.2	1.44	
Holly	102	50	76.6	3.40	
Holyoke (near)	98	46	70.8	5.50	
Husted	94	36	65.0	0.70	
Lake Moraine	73	36	54.6	2.80	
Lamar	103	49	76.7	2.67	
Laporte				0.54	
Las Animas	102	51	74.6	2.60	
Lay	92	27	63.8	0.16	
Leadville (near)	78	34	55.2	1.06	
Leroy	99	45	70.8	3.44	
Longs Peak	75	29	55.4	0.70	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Mancos	87	35	65.2	0.44	
Marshall Pass				1.59	
Meeker	92	35	63.6	1.11	
Montrose				0.37	
Moraine	82	32	59.4	0.90	
Pagoda				1.45	
Parachute	98	42	72.0	0.06	
Platte Canon				0.83	
Rangely	94	40	67.2	2.12	
Rockyford	101	49	74.3	0.87	
Rogers Mesa	98	41	71.2	0.26	
Russell	84	27	57.8	2.12	
Saguache	88	37	63.2	1.15	
Salida	91	32	64.4	0.90	
San Luis	85	35	62.0	0.27	
Santa Clara	85	39	63.6	2.12	
Sapinero				0.30	
Silt	98	32	69.8	0.39	
Sugar Loaf	87	40	65.8	1.47	
Trinidad	92	52	70.4	2.08	
Twinlakes				0.54	
Vilas				0.09	
Wallet				0.57	
Waterdale	97	39	67.3	0.29	
Westcliffe	88			1.34	
Whitepine	78	27	53.5	1.21	
Wray	97	44	72.2	1.48	
Yuma				3.12	
Connecticut.					
Bridgeport	88	47	66.8	11.24	
Canton	83	43	60.8	7.34	
Colchester	83	44	62.8	6.00	
Falls Village				5.93	
Hartford	83	48	64.0	7.91	
Hawleyville	83	42	63.2	7.41	
Lake Konomoc				5.37	
New London	85	51	65.6	5.70	
North Grosvenor Dale	84	40	63.0	4.59	
Norwalk	86	43	65.0	10.05	
Southington	83	45	63.0	6.90	
South Manchester				5.62	
Storrs	82	43	61.8	4.52	
Voluntown	82	41	63.6	3.79	
Wallingford				5.96	
Waterbury	86	45	64.4	6.36	
West Cornwall	83	42	61.2	5.65	
West Simsbury				7.21	
Delaware.					
Delaware City				3.97	
Milford	98	53	72.5	5.35	
Millsboro	99	56	73.3	3.35	
Newark	98	49	70.6	5.84	
Seaford	96	56	73.4	4.38	
District of Columbia.					
Distributing Reservoir *5	91	61	72.6	5.14	
Receiving Reservoir *5	95	60	72.2	5.53	
West Washington	97	53	72.9	5.57	
Florida.					
Archer	96	68	81.1	10.71	
Avon Park	98	70	83.8	4.85	
Bartow	95	71	83.2	11.64	
Bonifay	98	70	82.6		
Carrabelle	93	70	80.2	8.17	
Clermont	99	70	82.1	6.84	
De Funiak Springs	96	67	80.9	9.96	
Eustis	101	73	84.2	4.39	
Federal Point	96	70	82.8	4.19	
Fernandina	97	71	82.6	3.06	
Fort George *1	93	74	81.9		
Fort Meade	97	69	83.4	10.86	
Fort Pierce	96	67	81.4	5.82	
Gainesville	97	69	82.0	8.63	
Grasmere	96	71	83.2		
Huntington	101	68	83.8	5.20	
Hypoluxo	91	70	80.8	3.94	
Inverness	95	69	81.8	10.27	
Johnstown	97	65	82.0	14.79	
Kissimmee	99	71	82.5	4.31	
Lake City	98	68	82.0	10.04	
Macclenny	102	70	83.9	7.07	
Madison	96	70	83.6	7.79	
Malabar	98	70	83.2	4.84	
Manatee	96	68	81.6	4.50	
Marco	97	70	83.6	6.71	
Marianna	94	70	81.4	4.56	
Merritt Island	95	73	83.8	6.78	
Middleburg	102	66	82.2	10.01	
Molino	100	66	82.0	5.94	
New Smyrna	94	69	80.0	8.75	
Ocala	99	69	82.6	9.70	
Orange Home	97	69	82.4	4.94	
Orlando	99	73	85.4	3.68	
Pinemount	99	71	83.0	9.55	
Plant City	97	68	83.0	7.00	
St. Andrews	95	71	82.6	7.95	
St. Augustine	97	68	82.0	3.48	
St. Leo	98	69	81.8	6.32	
Stephensville f	97	70	81.5	14.69	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Florida—Cont'd.	°	°	°	*Ins.*	*Ins.*
Sumner	95	69	80.7	14.14	
Switzerland	96	69	81.4	6.22	
Tallahassee	94	72	81.6	2.98	
Tarpon Springs	97	69	82.4	8.15	
Titusville	96	67	82.1	4.77	
Waukeenah	96	69	81.6		
Wausau	100	70	82.4	7.65	
Wewahitchka	98	63	82.3	7.30	
Georgia.					
Abbeville				6.04	
Adairsville	95	62	79.0	1.72	
Albany	100	69	83.6	7.25	
Allapaha	96	68	82.3	7.96	
Americus	96	70	81.7	5.09	
Athens	93	63	79.2	6.47	
Bainbridge	94	69	80.8	6.17	
Bowersville	96	65	79.6	7.22	
Butler				7.92	
Camak	97	68	81.6	1.70	
Canton				2.74	
Carlton				4.10	
Clayton	90	59	73.8	7.71	
Columbus	99	70	82.7	2.12	
Coney	99	68	82.0	8.09	
Covington	96	67	80.2	5.19	
Dahlonega	91	59	76.3	2.46	
Dawson	99	65	82.5	5.50	
Diamond	97	56	76.2	3.69	
Douglas	104	67	84.0	6.87	
Dublin				6.83	
Dudley	99	62	83.6	3.33	
Eastman	102	69	84.0	6.36	
Elberton	98	67	77.6	4.02	
Experiment	96	64	79.2	5.46	
Fitzgerald	99	55	82.3	12.81	
Fleming	101	67	83.0	9.10	
Forsyth	99	61	81.4	5.58	
Fort Gaines	99	69	82.6	6.22	
Gainesville	95	65	78.4	3.83	
Gillsville	95	65	79.2	4.65	
Greensboro	100	60	80.0	3.36	
Greenbush	94	63	78.8	3.84	
Griffin	98	65	80.2	5.14	
Harrison	97	70	81.2	4.88	
Hawkinsville	99	69	81.7	10.78	
Hephzibah	101			7.10	
Jesup	102	70	85.5	8.96	
Lost Mountain	95	61	79.2	3.08	
Louisville	97	70	81.3	4.64	
Lumpkin	103	69	83.1	2.22	
Marshallville	96	72	81.6	7.69	
Mauzy	97	68	81.7	10.03	
Millen	100	68	83.0	4.24	
Monticello	99	67	81.2	5.70	
Morgan	94	65	79.6	7.68	
Naylor	99	70	83.4	7.08	
Newnan	99	64	80.2	1.26	
Oakdale				1.67	
Oakfield				6.54	
Point Peter	96	64	79.4	5.93	
Poulan	97	69	81.5	7.37	
Putnam	98	68	81.6	8.65	
Quitman	98	70	82.3	7.98	
Ramsey	94	59	77.2	2.39	
Resaca				2.98	
Rome	98	60	79.6	3.20	
St. Marys	101	69	83.4	5.14	
Statesboro	101	67	82.5	9.10	
Talbotton	98	64	79.9	3.83	
Tallapoosa	99	59	79.2	1.66	
Thomasville	99	69	82.8	5.73	
Toccoa	95	65	78.6	3.42	
Valona	102	68	82.3	13.85	
Vidalia	100	68	83.4	10.58	
Washington	95	68	80.2	3.48	
Waverly	101	69	83.2	6.54	
Waycross	99	70	83.3	9.15	
Waynesboro	95	68	79.8	8.71	
Westpoint	104	66	82.8	3.95	
Woodbury	97	64	79.6	7.56	
Idaho.					
Albion	94	35	66.2	0.13	
American Falls	99	39	69.2	0.44	
Blue Lakes	104	47	72.4	T.	
Burnside	90	45	67.0	0.40	
Cambridge	102	39	68.8	1.19	
Chesterfield	95	25	60.4	0.08	
Dickey		34		0.25	
Forney	97	27	61.5	0.23	
Garnet	110	49	77.2	T.	
Grangeville	96	40	65.2	2.03	
Lake	84	32	57.3	0.50	
Lakeview	90	42	64.3	2.02	
Lost River	89	32	63.1	0.04	
Meadows	99	31	62.1	1.52	
Moscow	98	39	64.4	1.43	
Murray	94	37	61.8	2.07	
Oakley	100	39	69.6	0.20	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
***Idaho*—Cont'd.**	°	°	°	*Ins.*	*Ins.*
Ola	101	41	69.4	0.39	
Payette	.....	42	.....	0.41	
Pollock	103	47	71.0	1.00	
Porthill	89	41	62.7	1.79	
Priest River	94	37	62.2	1.36	
Riddle	94	31	64.7	0.00	
Roosevelt	82[1]	28[1]	56.9[1]	0.21	
St. Maries	99	39	64.8	1.31	
Soldier	97	33	63.8	0.06	
Vernon	94	34	64.6	0.20	
Weston	98	35	68.0	0.14	
Illinois.					
Albion	99	53	75.7	4.92	
Aledo	95	51	71.0	6.53	
Alexander	95	52	73.2	2.90	
Antioch	90	49	67.6	7.95	
Ashton	90	48	67.6	4.95	
Astoria	92	50	71.0	4.43	
Aurora	92	47	68.6	5.39	
Benton	101	53	78.2	3.13	
Bloomington	97	48	72.7	2.04	
Bushnell	98	52	73.8	5.20	
Cambridge	95	53	71.0	3.96	
Carlinville	96	53	74.0	3.38	
Centralia	100	52	76.0	4.97	
Charleston	94	55	73.2	5.57	
Chester	.....	.....	.....	4.35	
Chicago Heights	.....	.....	.....	4.59	
Cisne	99	53	75.7	7.12	
Coatsburg	96	49	73.4	4.23	
Cobden	100	53	77.8	1.85	
Decatur	96	50	73.1	5.16	
Dixon	93	43	69.2	5.64	
Equality	100	54	76.9	1.62	
Fandon	96	50	73.0	4.37	
Flora	.....	.....	.....	5.62	
Friendgrove	96	53	74.4	4.52	
Galva	97	50	70.0	4.91	
Grafton	.....	.....	.....	4.44	
Greenville	101	53	75.9	2.84	
Griggsville	97	51	77.2	4.52	
Halfway	97	53	77.2	1.46	
Havana	98[a]	54[a]	74.2[a]	5.48	
Henry	95	50	71.4	5.50	
Hillsboro	98	55	74.8	5.63	
Hoopeston	95	50	71.1	5.78	
Joliet	93	52	69.9	4.77	
Kishwaukee	93	42	68.4	9.29	
Knoxville	96	49	70.1	6.40	
Laharpe	98	50	72.6	5.60	
Lanark	92	43	67.8	6.26	
La Salle[b]	101	53	74.2	4.95	
Loami	.....	.....	.....	3.76	
McLeansboro	99	54	77.0	3.90	
Martinsville	93	54	72.4	4.50	
Martinton	97	47	70.6	3.88	
Mascoutah	96	54	72.4	3.30	
Mattoon	92	50	72.2	6.73	
Minonk	94	43	69.9	4.49	
Monmouth	99	47	71.6	6.32	
Morrison	92	49	68.7	5.78	
Morrisonville	95	54	73.6	4.36	
Mount Carmel	.....	.....	.....	2.71	
Mount Pulaski	97	53	72.8	3.13	
Mount Vernon	98	53	76.8	2.87	
New Burnside	102	53	79.4	2.13	
Olney	96	56	75.9	2.49	
Ottawa	96	53	72.0	4.90	
Palestine	94	57	75.0	6.83	
Pana	97	53	73.6	4.83	
Paris	95	56	73.2	3.48	
Peoria *a*	.....	.....	.....	7.11	
Peoria *b*	96	53	72.8	7.22	
Philo	95	49	71.4	2.39	
Plumhill	101	53	75.8	3.43	
Pontiac	93	52	71.6	2.60	
Rantoul	96	51	71.6	4.66	
Raum	99	52	76.8	2.35	
Riley	92	49	67.6	6.52	
Robinson	95	52	72.4	5.37	
Rockford	91	49	69.0	7.59	
Rushville	96	50	73.2	4.26	
St. Charles	92	49	68.1	4.83	
St. John	100	53	77.2	2.39	
Shobonier	100	51	74.6	2.87	
Streator	95[b]	49	70.8[f]	4.04	
Sullivan	95	53	72.2	3.58	
Sycamore	93	50	68.8	5.14	
Tilden	100	50	75.2	3.58	
Tiskilwa	94	51	69.6	4.26	
Tuscola	94	52	71.9	4.46	
Urbana	94	52	71.6	2.33	
Walnut	97	50	70.6	4.53	
Winchester	95[b]	54[b]	73.8[b]	3.01	
Winnebago	91	40	68.5	7.66	
Yorkville	92	50	69.3	5.15	
Zion	92	47	68.4	5.51	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Indiana.	°	°	°	*Ins.*	*Ins.*
Anderson	96	53	71.6	3.96	
Angola	89	48	67.4	5.80	
Auburn	91	43	69.2	3.50	
Bloomington	91	57	73.2	5.46	
Butlerville	97	54	73.8	2.07	
Cambridge City	93	49	70.3	2.66	
Columbus	95	50	72.5	4.28	
Connersville	94	51	71.4	2.64	
Crawfordsville	100	55	74.2	4.63	
Delphi	98	50	71.2	3.49	
Elkhart	92	52	69.4	4.82	
Farmersburg	95	52	72.8	3.93	
Farmland	93	53	70.4	3.97	
Fort Wayne	92	51	69.6	3.57	
Franklin*[1]	92	61	72.0	2.29	
Greencastle	92	55	71.8	5.61	
Greensburg	94	52	72.6	1.92	
Hammond	90	51	69.3	2.49	
Hector	95	50	71.2	2.56	
Holland	98	54	75.4	3.55	
Huntington	94	51	70.6	3.17	
Jeffersonville	96	57	75.8	3.57	
Kokomo	95[c]	53[c]	71.6[c]	4.95	
Lafayette	96	54	71.6	5.05	
Laporte	91	50	68.0	4.05	
Logansport	96	52	70.8	4.42	
Madison *a*	99	54	75.6	4.65	
Madison *b*	.....	.....	.....	4.47	
Marengo	96	50	74.5	3.85	
Marion	97	51	71.9	3.02	
Markle	95	48	69.2	3.30	
Mauzy	93	51	70.9	3.64	
Moores Hill	96	54	73.6	2.38	
Mount Vernon	100	54	79.2	7.17	
Northfield	95	47	69.6	3.66	
Paoli	98	52	74.2	3.74	
Princeton	96	52	75.4	3.55	
Rensselaer	92	50	69.6	5.11	
Richmond	94	49	71.0	2.48	
Rockville	93	52	72.0	6.04	
Rome	97	56	76.7	5.17	
Salem	97	51	73.0	2.89	
Scottsburg	95	59	75.0	4.08	
Seymour	94	58	73.4	3.45	
Shelbyville	95[f]	52[f]	73.1[f]	.....	
South Bend	92	48	68.5	5.21	
Syracuse	94	46	69.4	4.83	
Terre Haute	96	57	75.1	3.38	
Topeka	90	46	66.8	.....	
Valparaiso	95	43	68.0	3.95	
Veedersburg	97[e]	51[e]	72.6[e]	4.05	
Vevay	97	55	74.2	2.65	
Vincennes	100	55	75.6	4.36	
Washington	98	52	74.8	4.78	
Winamac	93[1]	46[1]	69.0[1]	3.76	
Worthington	95	51[d]	72.8	3.29	
Indian Territory.					
Ardmore	104	57	82.5	1.25	
Chickasha	103	58	82.0	4.74	
Durant	102	59	82.1	3.45	
Fairland	95	51	76.8	4.14	
Goodwater	99	58	80.4	2.79	
Healdton	103	54	82.4	1.39	
Holdenville	98	59	79.8	2.42	
Marlow	106	58	81.6	1.59	
Muskogee	98	59	79.2	2.70	
Pauls Valley	106	53	80.6	2.02	
Ravia	101	58	81.6	1.23	
Roff	101	59	80.7	1.60	
South McAlester	103	59	81.8	5.25	
Tahlequah	.....	.....	.....	7.06	
Tulsa	.....	.....	.....	3.07	
Wagoner	97	57	78.8	5.25	
Webbers Falls	98	58	79.0	6.59	
Iowa.					
Afton	94	48	71.0	12.34	
Albia	95[b]	59[b]	70.8[b]	7.49	
Algona	91	47	68.1	3.90	
Allerton	95	49	71.0	11.58	
Alta	88	47	66.5	6.28	
Amana	94	50	69.4	7.31	
Ames	92	49	69.4	3.70	
Atlantic	92	44	70.1	9.10	
Baxter	93	46	69.2	5.35	
Bedford	90	45	70.4	9.46	
Belknap	95	53	73.2	6.72	
Belleplaine	93	50	69.8	8.46	
Bonaparte	98	48	71.5	7.53	
Britt	90	43	67.2	4.50	
Buckingham	.....	.....	.....	7.11	
Burlington	95	51	72.8	7.63	
Carroll	92	42	68.7	6.00	
Cedar Rapids	97	51	69.7	6.12	
Chariton	93	43	69.9	14.05	
Charles City	89	46	65.9	4.38	
Chester	85	43	64.6	8.41	
Clarinda	95	47	71.6	9.50	
Clearlake	91	46	68.6	9.59	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
***Iowa*—Cont'd.**	°	°	°	*Ins.*	*Ins.*
Clinton	93	48	69.4	4.79	
College Springs	95	52	72.2	8.36	
Columbus Junction	96	50	70.4	9.10	
Corning	90	45	69.4	13.80	
Corydon	95	49	65.9	10.14	
Council Bluffs	.....	.....	.....	15.09	
Cumberland	.....	.....	.....	9.32	
Danville	.....	.....	.....	5.97	
Decorah	84	48	65.8	8.07	
Delaware	88	47	66.7	4.14	
Denison	88	43	67.8	6.58	
Desoto	91	48	69.0	6.40	
Dows	89	44	67.0	4.47	
Earlham	90	43	68.0	8.20	
Elkader	91	47	68.7	7.18	
Estherville	89	43	66.2	3.26	
Fayette	89	44	65.4	4.75	
Forest City	90	48	66.8	4.38	
Fort Dodge	89	46	67.2	.....	
Fort Madison	.....	.....	.....	5.09	
Galva	89	44	67.1	6.11	
Gilman	.....	.....	.....	4.85	
Grand Meadow	86	48	65.2	9.52	
Greene	90	45	67.8	5.16	
Greenfield	89	48	69.0	6.84	
Grinnell	94	49	68.8	7.13	
Grundy Center	91	46	68.7	4.03	
Guthrie Center	93	44	68.2	5.05	
Hampton	93	48	69.0	5.28	
Hanlontown	88	45	66.3	6.15	
Harlan	92	44	69.2	9.39	
Hopeville	95	49	71.1	12.24	
Humboldt	91	45	70.6	3.21	
Independence*	.....	46	67.6	.....	
Indianola	93	51	71.8	7.54	
Iowa City	97	51	70.0	3.45	
Iowa Falls	89	45	66.6	2.77	
Jefferson	.....	.....	.....	6.17	
Keosauqua	98	49	73.0	6.18	
Lacona	.....	.....	.....	9.16	
Larchwood	89	45	68.0	4.87	
Larrabee	92	46	68.2	5.83	
Leclaire	.....	.....	.....	4.26	
Lemars	89	45	67.5	5.79	
Lenox	92	49	70.6	10.60	
Leon	93	50	71.6	10.48	
Logan	101	48	75.0	11.66	
Maple Valley	.....	.....	.....	6.04	
Maquoketa	93	46	68.6	5.24	
Marshalltown	94	47	69.4	3.23	
Mason City	90	47	67.8	6.23	
Monticello	95	46	72.0	4.54	
Mountayr	93	50	72.2	6.85	
Mount Pleasant	98	48	73.2	5.32	
Mount Vernon	93	47	69.1	4.72	
New Hampton	85[d]	45[d]	63.8[d]	4.75	
Newton	92	50	69.0	9.02	
Northwood	84	47	66.0	6.94	
Odebolt	92	43	70.8	6.44	
Ogden	91	41	68.0	5.47	
Olin	92	49	68.7	5.02	
Onawa	91	51	70.9	11.62	
Osage	85	45	64.1	4.43	
Osceola	94	50	70.6	11.30	
Oskaloosa	94	52	70.6	5.72	
Ottumwa	99	42	71.8	7.53	
Pacific Junction	91	48	70.6	6.28	
Perry	93	48	70.0	8.31	
Plover	90	44	67.9	4.25	
Primghar	88	43	66.8	5.35	
Redoak	88	52	71.3	11.61	
Ridgeway	90	48	68.5	5.87	
Rockwell City	94	48	69.2	4.93	
Sac City	90	47	69.2	6.16	
St. Charles	93	50	70.8	7.43	
Scranton	94	50	70.8	7.99	
Sheldon	89	45	65.2	4.87	
Sibley	88	44	65.0	3.91	
Sigourney	98	49	71.8	6.37	
Sioux Center	90	45	67.5	4.33	
Stockport	.....	.....	.....	5.91	
Storm Lake	86	46	67.0	7.65	
Stuart	96	48	70.5	5.23	
Thurman	90	46	70.5	6.37	
Tipton	96	52	71.8	2.57	
Toledo	92	48	69.2	2.55	
Villisca	90	48	69.6	12.02	
Vinton [e]	91	51	68.2	3.94	
Wapello	96	52	71.4	5.60	
Washington	98	48	67.8	4.76	
Washta	.....	.....	.....	5.08	
Waterloo	90	46	68.0	5.17	
Waukee	.....	.....	.....	9.33	
Waverly	88	49	67.6	3.06	
Westbend	90	45	67.0	3.61	
West Union	.....	.....	.....	6.14	
Whitten	93	45	68.8	3.42	
Wilton Junction	96	48	70.4	3.52	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Winterset	95	47	71.2	8.44	
Woodburn	.....	.....	.....	17.74	
Kansas.					
Achilles	101	39	72.4	1.03	
Alton	96[4]	52[4]	74.2[4]	5.95	
Anthony	.....	.....	.....	4.04	
Atchison	93	52	72.6	9.23	
Baker	95	51	72.6	7.65	
Beloit	93	53	74.4	3.33	
Burlington	95	49	75.6	9.97	
Clay Center	97	47	74.9	3.94	
Colby	100	42	73.0	3.04	
Columbus	95	51	75.6	6.62	
Cottonwood	96	51	75.0	8.26	
Cunningham	98	43	76.7	3.25	
Dresden	97	44	73.4	2.69	
Ellinwood	95	54	76.4	7.37	
Emporia	94	51	73.6	7.51	
Englewood	104	54	80.8	3.23	
Eureka	.....	.....	.....	4.88	
Eureka Ranch	102	46	75.7	2.44	
Fall River	94	53	75.8	5.89	
Farnsworth	97	45	74.4	5.82	
Forsha	98	52	77.8	5.77	
Fort Leavenworth	97	53	75.2	9.54	
Fort Scott	99	49	76.2	7.95	
Frankfort	96	47	74.2	8.35	
Fredonia	97	52	76.2	4.63	
Garden City	106	60	79.8	3.65	
Gove[e1]	100	55	72.2	3.56	
Grenola	94	51	74.6	4.57	
Hanover	96	50	74.1	6.85	
Harrison	93	47	72.2	4.99	
Hays	96	49	74.0	4.55	
Horton	94	51	73.0	5.58	
Hoxie	98	46	75.0	3.21	
Hutchinson	97	49	75.2	1.91	
Independence	104	55	78.4	3.92	
Jetmore	.....	54[e]	.....	2.39	
La Crosse	97	48	75.4	6.02	
Lakin	101	49	76.4	2.75	
Lebanon	90	52	72.3	7.10	
Lebo	94	51	75.2	7.78	
Leoti	100	48	75.1	5.43	
Macksville	100	50	75.5	5.60	
McPherson	99	53	76.6	6.39	
Madison	94	49	74.1	5.99	
Manhattan *b*	102	47	76.7	6.17	
Manhattan *c*	100	48	76.1	6.45	
Marion	96	53	76.4	5.05	
Medicine Lodge	105	56	79.6	1.17	
Minneapolis	94	52	75.2	7.53	
Moran	92	51	75.1	7.87	
Mounthope	95	56	77.0	4.21	
Ness City	102	50	77.9	9.05	
Newton	99	50	76.6	4.20	
Norwich	98	53	77.6	4.12	
Oberlin	.....	.....	.....	2.55	
Olathe	94	50	73.8	5.80	
Osborne	.....	.....	.....	5.66	
Oswego	96	52	76.3	6.14	
Ottawa	95	45	73.6	7.73	
Paola	96	48	75.5	5.89	
Phillipsburg	.....	.....	.....	3.85	
Pittsburg	95	.....	.....	6.66	
Pleasanton	95	49	75.0	6.46	
Pratt	104	53	79.4	1.78	
Republic	92	47	72.6	5.68	
Rome	99	54	78.0	3.37	
Salina	98	52	76.4	6.32	
Sedan	98	54	77.2	4.56	
Toronto	96	49	75.2	3.79	
Ulysses	105[e]	56[4]	79.2[4]	1.67	
Valley Falls	91	49	71.9	7.91	
Viroqua	105	49	76.0	1.78	
Wakeeney	.....	.....	.....	2.69	
Wallace	104	44	74.6	0.73	
Walnut	94	53[m]	75.2[f]	5.93	
Wamego[e1]	94	53	73.5	7.59	
Winfield	98	55	76.4	4.59	
Yates Center	94	46	74.0	4.35	
Kentucky.					
Alpha	92	60	74.8	5.62	
Anchorage	97	55	74.4	2.90	
Bardstown	97	55	76.7	4.59	
Beattyville	.....	.....	.....	3.77	
Beaver Dam	97	55	75.8	3.95	
Berea	94	53	74.2	3.33	
Blandville	96	54	77.2	0.66	
Bowling Green	97	53	76.6	2.03	
Burnside	96	55	76.1	2.23	
Cadiz	100	55[e]	78.6[e]	1.13	
Calhoun	97	53	75.3	3.52	
Catlettsburg	98	50	74.7	3.02	
Earlington	98	54	76.8	2.05	
Edmonton	94	51	74.3	2.19	
Eubank	88	52	71.5	3.75	
Falmouth	.....	.....	.....	4.36	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fords Ferry	97	49	76.0	3.85	
Frankfort	93	56	74.3	2.39	
Franklin	94	55	76.2	1.00	
Greensburg	94	54	74.4	5.25	
Highbridge	.....	.....	.....	3.43	
Hopkinsville	96	54	77.3	4.08	
Irvington	93	58	75.5	4.58	
Jackson	94	59	74.6	2.21	
Leitchfield	94	56	74.3	3.95	
Loretto	95	52	73.6	6.01	
Manchester	94	57	75.7	5.97	
Marrowbone [e]	94	50	75.2	.....	
Mayfield	96	55	78.3	2.20	
Maysville	97	51	75.0	1.25	
Middlesboro	92	55	74.7	5.31	
Mount Sterling	97	55	75.2	2.17	
Owensboro	94	59	75.8	4.45	
Owenton	94	52	74.0	4.45	
Paducah *a*	.....	.....	.....	1.42	
Paducah *b*	100	57	80.3	2.08	
Richmond	.....	.....	.....	4.04	
St. John	91	56	73.6	4.50	
Scott	97	53	74.2	1.20	
Shelby City	94	53	73.4	3.80	
Shelbyville	99	54	75.5	2.73	
Taylorsville	93	52	73.6	3.55	
Williamsburg	93	55	75.2	3.92	
Williamstown	98	55	73.9	3.36	
Louisiana.					
Abbeville	97	67	82.2	4.23	
Alexandria	99	69	82.8	2.92	
Amite	97	65	82.1	6.66	
Baton Rouge	93	65	80.8	3.91	
Burnside	95	65	81.1	6.12	
Calhoun	96	62	79.0	5.62	
Cameron	92	70	82.0	1.89	
Caspiana	.....	.....	.....	3.67	
Cheneyville	98	69	82.0	5.70	
Clinton	93	66	80.4	4.51	
Collinston	97	56	81.2	3.77	
Covington	98	65	82.8	5.91	
Donaldsonville	97	69	81.5	4.59	
Emilie	92	65	80.2	6.65	
Farmerville	98	57	80.7	5.79	
Franklin	98	68	82.7	5.44	
Grand Coteau	97	65	82.6	2.36	
Hammond	94	64	80.8	4.39	
Houma	94	66	81.4	11.12	
Jennings	96	69	81.6	6.06	
Lafayette	94	67	81.0	4.92	
Lake Charles	96	70	82.0	3.50	
Lake Providence	95	64	79.8	5.16	
Lakeside	96	71	82.2	3.59	
Lawrence	97	65	83.4	4.85	
Leesville	97	66	80.8	2.81	
Libertyhill	101	68	82.6	4.12	
Mansfield	97	65	80.8	4.17	
Melville	95	66	82.0	2.62	
Minden	100	67	82.6	4.29	
Monroe	100	68	83.4	8.92	
New Iberia	91	70	81.0	2.00	
Opelousas	95	65	81.6	3.64	
Oxford	99	.....	.....	3.12	
Plain Dealing	98	63	80.5	2.69	
Port Eads	92	73	83.5	4.21	
Rayne	100	67	83.2	1.80	
Reserve	98	64	80.8	4.60	
Robeline	97	65	80.4	7.40	
Ruston	100	63	81.2	5.58	
Schriever	96	66	80.8	4.69	
Sugar Experiment Station	94	70	82.8	5.98	
Sugartown	93	70	82.2	4.14	
Venice	93	70	81.2	5.00	
Wallace	97	65	81.3	4.48	
Maine.					
Bar Harbor	78	42	60.9	0.75	
Belfast	80	40	59.8	2.69	
Bemis	81	37	57.2	2.82	
Cornish	89	43	61.1	3.28	
Danforth	.....	.....	.....	2.46	
Farmington	84	39	60.0	2.67	
Gardiner	83	44	62.6	2.90	
Houlton	82	36	60.5	1.55	
Lewiston	83	46	63.0	2.53	
Mayfield	77	42	58.2	3.03	
Millinocket	81	41	60.1	2.48	
North Bridgton	84	43	62.4	2.88	
Orono	81	38	60.6	2.22	
Patten	80	29	55.8	2.64	
Rumford Falls	85	43	60.6	2.96	
South Lagrange	84	34	60.6	.....	
The Forks	.....	.....	.....	3.24	
Vanburen	83	35	59.2	3.05	
Winslow	85	31	61.2	3.37	
Maryland.					
Annapolis	95	.....	.....	6.67	
Bachmans Valley	92	48	68.3	8.34	
Boettcherville	100	45	72.1	3.18	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Boonsboro	98	49	70.4	3.78	
Cambridge	100	59	74.6	7.15	
Chase	96	49	70.9	7.44	
Cheltenham	93	51	70.4	5.58	
Chestertown	91	56	71.5	4.96	
Chewsville	96	47	69.6	4.19	
Clearspring	96	49	68.6	3.88	
Coleman	95[e]	53[e]	72.0[e]	6.00	
Collegepark	94	50	71.6	3.51	
Colora	.....	.....	.....	4.59	
Cumberland	.....	.....	.....	4.16	
Darlington	95	41	67.7	5.34	
Deerpark[1]	90	37	64.4	.....	
Denton	95	52	71.6	4.03	
Easton	97	52	72.0	4.63	
Fallston	94	49	69.6	5.05	
Frederick	98	50	71.7	7.83	
Grantsville	89	38	64.7	3.33	
Greatfalls	99	51	72.6	4.51	
Greenspring Furnace	98	48	70.0	3.55	
Hancock	100	48	71.3	3.41	
Harney	.....	.....	.....	5.23	
Jewell	94	57	72.0	5.12	
Johns Hopkins Hospital	97	57	73.5	6.60	
Laurel	97	50	71.0	7.04	
McDonogh	93	48	70.0	7.55	
Mount St. Marys College	96	53	69.4	5.21	
New Market	95	51	70.0	7.57	
Princess Anne	91	56	72.2	6.31	
Sharpsburg	95	56	70.6	5.63	
Solomons	96	61	74.6	4.97	
Sudlersville	95	51	72.4	5.27	
Takoma Park	97	54	71.2	5.40	
Van Bibber	93	52	70.0	7.38	
Westernport	96	46	70.0	3.37	
Woodstock	95	52	72.2	4.39	
Massachusetts.					
Amherst	84	42	62.3	4.92	
Bedford	82	46	62.0	2.71	
Bluehill (summit)	82	47	62.8	4.36	
Cambridge	85	46	64.4	3.56	
Chestnuthill	86	46	64.4	4.01	
Cohasset	.....	.....	.....	3.66	
Concord	85	43	61.9	3.26	
East Templeton[e1]	80	52	61.2	3.37	
Fall River	83	52	65.8	4.11	
Fitchburg *a*[e1]	82	52	62.4	3.43	
Fitchburg *b*	83	45	62.2	3.06	
Framingham	85	44	63.0	3.60	
Groton	82	44	61.2	3.79	
Hyannis	.....	.....	.....	4.10	
Jefferson	.....	.....	.....	3.89	
Lawrence	84	47	63.8	3.09	
Leominster	.....	.....	.....	3.22	
Lowell *a*	86	47	65.0	3.68	
Lowell *b*	85	45	63.7	.....	
Ludlow Center	81	39	58.9	5.79	
Middleboro	84	42	62.1	3.56	
Monson	82	41	61.7	4.14	
New Bedford	82	48	64.0	4.47	
Plymouth[e1]	81	53	63.9	5.65	
Princeton	.....	.....	.....	4.30	
Provincetown	80	45	64.4	3.64	
Salem	.....	.....	.....	3.82	
Somerset[e1]	90	48	68.0	4.01	
Sterling	.....	.....	.....	3.34	
Taunton	83	43	62.4	4.05	
Webster	.....	.....	.....	4.45	
Westboro	85	44	63.6	3.84	
Weston	82	42	62.0	3.92	
Williamstown	79	42	60.4	7.51	
Winchendon	.....	.....	.....	3.36	
Worcester	84	48	64.2	3.31	
Michigan.					
Adrian	92	44	67.5	5.25	
Agricultural College	85	41	64.3	6.73	
Allegan	90[e]	42[e]	67.3[e]	4.52	
Alma	85	41	64.4	7.84	
Ann Arbor	86	45	66.1	5.45	
Annpere	82	44	63.2	1.66	
Arbela	85	40	65.1	7.77	
Baldwin	87[4]	40	63.0	2.68	
Ball Mountain	84	43	63.7	6.41	
Baraga	87	31	59.1	1.70	
Battlecreek	90	44	67.0	6.55	
Bay City	85	40	64.4	7.25	
Berlin	85	42	64.0	6.05	
Berrien Springs	95	48	67.2	7.02	
Big Rapids	86	38	62.6	3.73	
Birmingham	86	46	65.2	4.42	
Boon	80	33	58.7	2.98	
Calumet	78	46	59.0	2.79	
Cassopolis	91	50	68.5	6.40	
Charlevoix	82	48	63.4	0.51	
Chatham	88	35	59.6	5.93	
Cheboygan	84	40	61.6	4.40	
Clinton	91	44	67.4	4.36	
Coldwater	92	45	68.2	6.55	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Deerpark	82	39	58.6	2.54	
Detour	78	43	60.2	5.78	
Dundee	90	45	66.8	5.52	
Eagle Harbor	76	43	57.6	2.55	
East Tawas	85	41	62.4	3.25	
Eloise	87	44	67.0	3.33	
Ewen	81	31	57.1	3.67	
Fennville	88	45	66.1	5.27	
Fitchburg	86	40	64.0	6.48	
Flint	84	43	64.4	6.72	
Frankfort	77	40	60.9	.....	
Gaylord	86	36	61.5	6.70	
Gladwin [d]	88	35	63.4	1.50	
Grand Haven	80[a]	42	64.3[a]	5.83	
Grand Marais	81	47	59.2	3.43	
Grape	87	45	66.6	7.52	
Grayling	80	38	58.3	4.60	
Hagar	93	48	67.6	6.90	
Harbor Beach	84	41	63.2	4.32	
Harrison	.....	40	.....	2.75	
Harrisville	85	41	61.8	5.47	
Hart	85	40	59.9	2.78	
Hastings	88	41	66.4	5.65	
Hayes [d]	83	40	63.8	3.38	
Highland Station	.....	.....	.....	4.64	
Hillsdale	91	43	65.4	6.21	
Humboldt	87	33	56.7	.....	
Ionia [e]	87	42	64.8	.....	
Iron Mountain	85	41	60.7	5.31	
Iron River	83	34	58.2	5.55	
Ironwood	89	37	59.7	2.86	
Ishpeming	83	39	58.6	7.16	
Ivan	83	36	60.8	5.41	
Jackson	91	45	67.8	5.46	
Jeddo	85	42	64.2	6.75	
Kalamazoo	89[d]	46[d]	67.8[d]	3.37	
Lake City	82	40	63.4	3.80	
Lansing	86	44	65.0	5.68	
Lapeer	86	43	64.6	5.20	
Lincoln	.....	40	.....	.....	
Ludington	78	50	62.2	.....	
Mackinac Island	77	43	60.4	4.58	
Mackinaw	83	44	61.9	7.40	
Mancelona	88	40	64.1	0.65	
Manistee [k]	79	50	63.2	0.08	
Manistique	81	42	59.8	5.24	
Marine City	84[e]	42	64.6[e]	5.59	
Menominee	87	44	62.1	3.92	
Midland	82	.....	.....	.....	
Mio	81	36	58.7	5.08	
Montague	83	43	64.4	2.72	
Mount Pleasant	87	.....	.....	2.88	
Muskegon	83	45	64.6	3.88	
Newberry	84	.....	.....	4.55	
Old Mission	82	47	63.2	7.49	
Olivet	86	47	65.0	5.32	
Omer	89	41[l]	63.0[d]	2.81	
Onaway	83	40	60.8	6.77	
Ontonagon	73	40	56.4	3.79	
Ovid	84	40	63.4	5.13	
Owosso	.....	44	.....	2.80	
Petoskey	85	43	62.5	4.77	
Plymouth	.....	.....	.....	2.50	
Port Austin	82	41	62.6	2.44	
Reed City	80[m]	37[e]	63.2[e]	.....	
Roscommon	84[e]	42[m]	62.2[l]	5.41	
Saginaw (W. S.)	86	42	63.2	6.07	
St. Ignace	.....	.....	.....	4.71	
St. Johns [l]	85	44	65.8	.....	
St. Joseph	85	.....	.....	3.50	
Slocum	79	51	65.2	2.91	
Somerset	89[b]	42[d]	64.0[d]	4.70	
South Haven	87	45	64.8	4.74	
Thomaston	82	32	57.7	4.30	
Thornville	84	45	64.8	7.18	
Traverse City	84	43	63.0	3.20	
Vassar	84	39	65.6	5.66	
Wasepi	90	46	65.9	5.53	
Waverly	88	45	65.0	4.64	
Webberville	85	42	64.6	5.66	
West Branch	84[e]	40[e]	61.2[e]	3.08	
Wetmore	77	.....	.....	2.45	
Whitefish Point	80	44	59.0	3.68	
Ypsilanti	85	45	65.0	6.05	
Minnesota.					
Albert Lea	88	45	65.6	6.42	
Alexandria	86	42	62.8	2.70	
Angus	93	37	61.8	3.88	
Ashby [b]	.....	42	61.2	3.02	
Beardsley	91	41	65.2	3.68	
Bemidji	88	41	63.5	3.71	
Bird Island	93	46	65.7	3.92	
Blooming Prairie	85	45	63.9	7.55	
Caledonia	84	46	64.2	7.25	
Campbell	88	44	64.7	3.06	
Collegeville	88	47	64.4	2.36	
Crookston	92	42	62.7	4.86	
Currie	94	43	66.0	4.11	
Deephaven	.....	.....	.....	5.53	
Detroit	89	39	62.2	5.34	
Duluth (sub station)	82	45	58.1	3.84	
Faribault	87	40	64.6	3.67	
Farmington	88	46	65.0	5.35	
Fergus Falls	91	47	65.0	3.06	
Floodwood	85	32	60.0	5.10	
Glencoe	92	40	64.6	4.16	
Grand Meadow	89	44	65.2	8.33	
Hallock	83	37	61.6	3.81	
Lake Winnibigoshish	79	40	60.5	4.93	
Leech	85	35	59.8	3.60	
Long Prairie	87	39	63.4	2.82	
Luverne	88	40	65.6	4.00	
Lynd	90	43	65.0	5.25	
Mapleplain	92[c]	45[d]	64.1[d]	5.42	
Milaca	87	38	62.4	3.96	
Milan	90	43	65.0	3.74	
Minneapolis [i]	90[e]	44	64.6	4.92	
Montevideo	91	40	64.0	2.79	
Morris	86	44	64.5	3.31	
Mount Iron	82	35	57.2	3.64	
New London	89	44	66.5	2.98	
New Richland	88	45	67.0	8.78	
New Ulm	91	46	67.2	5.87	
Park Rapids	87	40	60.2	4.68	
Pine River	85	36	60.8	7.60	
Pipestone	84	44	65.3	4.94	
Pleasant Mounds	87	47	65.7	6.57	
Pokegama Falls	85	32	58.8	4.53	
Redwing *a*	.....	.....	.....	4.40	
Redwing *b*	87	47	67.2	4.94	
Reeds	.....	.....	.....	5.72	
Rolling Green	87	48	68.2	2.93	
St. Charles	90	39	65.0	4.61	
St. Cloud	89	44	63.6	2.64	
St. Peter	90	42	66.6	4.33	
Sandy Lake Dam	83	38	60.3	4.47	
Shakopee	89	47	65.4	3.81	
Tower	84	29	53.0	4.30	
Two Harbors	87	39	58.4	5.57	
Wabasha	91	45	67.4	4.09	
Warroad	86	36	62.2	.....	
Willow River	88	36	61.2	4.76	
Winnebago	89	49	66.6	8.29	
Winona	85	47	65.4	6.56	
Worthington	87	43	65.0	5.10	
Wyoming	.....	.....	.....	2.14	
Zumbrota	85	44	65.2	4.49	
Mississippi.					
Aberdeen	100	59	81.4	3.69	
Agricultural College	99	60	80.6	3.35	
Austin	94	59	77.7	2.57	
Batesville	94	56	79.4	2.80	
Biloxi	95	70	82.7	4.68	
Boggan	96	63	80.1	5.38	
Booneville	94	57	78.8	4.74	
Brookhaven	98	64	81.8	3.30	
Canton	97	61	81.2	2.47	
Columbus	93	62	79.7	4.65	
Corinth	91	56	77.4	3.71	
Crystal Springs	95	62	80.9	6.54	
Duck Hill	100	53	81.4	3.40	
Edwards	97	63	81.0	4.52	
Fayette	92	60	79.3	7.25	
Fayette (near)	.....	.....	.....	5.74	
Greenville *a*	92	65	80.3	5.34	
Greenville *b*	97	65	82.4	5.37	
Greenwood	98	56	80.8	3.52	
Hattiesburg	99	64	81.4	3.41	
Hazlehurst	97	63	81.4	3.40	
Hernando	97	59	80.8	1.91	
Holly Springs	94	58	79.0	4.42	
Indianola	96	60	80.6	4.45	
Jackson	95	64	80.9	7.59	
Kosciusko	95	59	80.6	3.97	
Lake	94	61	79.5	7.26	
Lake Como	100	62	81.7	2.92	
Leakesville	99	58	81.4	4.16	
Louisville	95	60	79.8	3.47	
McNeill	.....	66	.....	7.11	
Macon	99	63	82.6	1.07	
Magnolia	96	62	80.6	4.09	
Natchez	95	66	82.0	8.05	
Nittayuma	96	60	81.4	3.01	
Okolona	101	57	82.8	4.25	
Patmos	.....	.....	.....	2.44	
Pearlington	98	66	81.6	6.19	
Pittsboro	96	57	80.0	4.43	
Pontotoc	92	57	78.9	3.71	
Port Gibson	97	63	81.5	5.59	
Poplarville	96	62	81.0	3.44	
Ripley	91	53	76.9	4.62	
Shoccoe	98	55	80.6	8.04	
Stonington	.....	.....	.....	6.05	
Suffolk	94[b]	62	80.0[b]	3.22	
Swartwout	96	69	81.5	6.88	
Thornton	94	66	82.1	3.53	
Tupelo	97	56	80.4	2.73	
University	98	57	80.5	4.77	
Utica	94[d]	62[d]	81.0[d]	4.85	
Walnutgrove	93[f]	60[f]	79.1[f]	5.91	
Watervalley	100	65	81.5	5.07	
Waynesboro	96	60	79.6	4.03	
Westpoint	97	60	82.1	3.45	
Woodville	93	66	80.9	5.97	
Yazoo City	97	60	82.0	5.55	
Missouri.					
Appleton City	97	53	75.4	6.35	
Arthur	95	47	74.9	6.31	
Avalon	101	48	76.9	4.46	
Bethany	92	46	70.8	6.42	
Birchtree	91[d]	59[d]	75.6[d]	4.53	
Blue Springs	97	50	73.6	6.37	
Boonville	.....	.....	.....	8.09	
Brunswick	94	52	73.6	11.54	
Carrollton	96	50	73.6	10.92	
Caruthersville	99[c]	55[c]	80.4[c]	2.23	
Conception	91	52	72.8	7.71	
Cowgill	.....	.....	.....	7.88	
Darksville	94	49	73.3	6.50	
Dean	99	47	76.0	4.42	
Desoto	98	51	75.6	4.48	
Downing	.....	.....	.....	7.98	
Edgehill	96	48	74.0	2.99	
Edwards	95	43	74.6	3.61	
Eightmile [g]	.....	58	75.0	6.94	
Fairport	.....	.....	.....	5.42	
Fayette	96	51	74.2	5.64	
Fulton	97	49	74.8	5.28	
Gallatin [d]	94	56	73.9	8.10	
Glasgow	94	50	74.2	6.18	
Gorin	.....	.....	.....	4.97	
Grant City	92	51	71.2	7.04	
Halfway	93	47	74.5	4.95	
Harrisonville	98	51	74.7	5.31	
Hazlehurst	.....	.....	.....	4.16	
Hermann	.....	.....	.....	3.08	
Houston	92	44	73.8	5.62	
Huntsville	96	50	73.7	6.22	
Ironton	98	46	75.9	3.51	
Jackson	96	50	76.4	4.72	
Jefferson City	95	50	75.0	5.06	
Joplin	93	52	76.5	3.91	
Kidder	93	50	72.6	5.67	
Koshkonong	94	52	75.8	3.99	
Lamar	98	51	76.6	5.24	
Lamonte	.....	.....	.....	4.29	
Lebanon	95	47	75.4	4.05	
Lexington	96	49	74.1	4.78	
Liberty	97	47	73.6	5.11	
Louisiana	96	48	74.0	4.02	
Macon	96	50	73.8	5.17	
Marblehill	102	49	78.1	1.17	
Marshall	93	54	73.4	7.48	
Maryville	92	51	71.3	11.63	
Mexico	96	49	74.5	6.96	
Miami [g] [h]	93	52	74.9	11.23	
Mineralspring	95	49	75.6	3.90	
Monroe City	97	48	74.3	5.44	
Montreal	94	43	73.3	5.39	
Mountaingrove	91	46	74.2	4.25	
Mount Vernon	101	44	76.0	3.09	
Neosho	94	47	75.6	5.35	
Nevada	.....	.....	.....	6.27	
New Haven	100	53	77.2	2.88	
New Madrid *b*	.....	.....	.....	2.28	
New Palestine	95	50	75.0	5.91	
Oakfield	98	50	75.6	4.14	
Olden	95	50	75.8	4.53	
Oregon	90	52	71.8	7.71	
Palmyra [g] [h]	96	56	73.4	4.94	
Pine Hill	.....	.....	.....	2.37	
Poplarbluff	98	52	78.0	1.50	
Princeton	100	49	73.3	6.45	
Protem	96	53	76.7	2.33	
Richmond	.....	.....	.....	4.00	
Rockport	.....	.....	.....	9.95	
Rolla	.....	.....	.....	5.75	
St. Charles	98	56	75.2	6.24	
St. Joseph	.....	.....	.....	8.10	
Sarcoxie	.....	.....	.....	2.82	
Sedalia	93	50	74.0	7.01	
Seymour	92	50	73.6	3.74	
Shelbina	.....	.....	.....	6.08	
Sikeston	96	51	77.0	1.45	
Steffenville	95	51	73.8	3.02	
Sublett	96	51	72.6	7.35	
Trenton	93	54	73.0	4.29	
Unionville	94	54	72.7	11.52	
Vichy	96[c]	46[c]	74.4[c]	4.35	
Warrensburg	96	50	75.1	7.19	
Warrenton	97	50	75.3	3.19	
Wheatland	.....	.....	.....	5.08	
Willowsprings	92	50	73.6	2.86	
Windsor	92	54	73.6	3.91	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Zeitonia	98	48	76.3	2.09	
Montana.					
Adel	91	31	57.0	1.01	
Anaconda	95	30	61.0	0.57	
Augusta	92	32	60.3	1.51	
Billings	105	32	65.3	.....	
Boulder	91	37	62.4	0.30	
Bozeman	91	39	63.2	0.50	
Butte	89	40	63.1	0.60	
Canyon Ferry	96	42	67.7	0.64	
Chinook	97	45	64.8	2.03	
Columbia Falls	91	36	61.6	1.57	
Crow Agency	95	46	68.9	0.90	
Culbertson	94	39	64.2	3.49	
Dayton	91	38	63.4	0.43	
Deerlodge	88	34	60.2	.....	
Dillon	89	32	62.4	1.16	
Fort Benton	.....	.....	.....	0.91	
Fort Harrison	94	40	65.8	.....	
Fort Logan	90	35	58.7	2.05	
Glasgow	98	42	65.0	1.02	
Glendive	102	38	66.3	2.27	
Greatfalls	96	42	65.5	0.74	
Hamilton	94	40	65.0	0.72	
Hayden	97	34	63.0	0.68	
Kipp	89	38	58.1	1.91	
Lamedeer	97	45	69.2	2.20	
Lewistown	95	36	62.2	0.75	
Marysville	91	40	60.8	0.73	
Ovando	93	32	60.6	0.93	
Parrot	94	38	66.4	0.08	
Plains	93	40	64.8	1.68	
Poplar	98	42	66.2	3.58	
Redlodge	88	34	60.8	0.60	
Ridgelawn	98	38	65.4	3.62	
St. Pauls	88	40	62.7	2.77	
St. Peter	87	35	58.4	1.36	
Springbrook	97	38	65.6	2.56	
Summit	86	30	53.0	.....	
Toston	91	36	63.0	0.63	
Townsend	.....	.....	.....	0.83	
Troy	95	35	62.4	0.85	
Twodot	93	39	62.8	0.72	
Utica	95	37	64.8	0.81	
Wolf Creek	93	36	62.0	0.55	
Wolsey	86	30	57.4	0.70	
Yale	94	35	64.1	0.24	
Nebraska.					
Agate	94	35	67.2	1.11	
Agee *1	100	54	70.2	2.65	
Albion	88	46	69.2	7.42	
Alliance	95	42	71.4	3.35	
Alma	98	54	73.6	4.98	
Ansley	99	49	72.2	6.61	
Arapahoe	.....	.....	.....	4.50	
Arcadia	.....	.....	.....	4.85	
Ashland *a*	93	50	72.0	5.77	
Ashton	.....	.....	.....	4.41	
Auburn	93	46	72.4	9.07	
Aurora	98	46	73.3	7.54	
Bartley	98	45	72.0	1.58	
Beatrice	92	49	71.8	6.25	
Beaver	98	49	73.2	3.39	
Bellevue	.....	.....	.....	6.34	
Benedict	.....	.....	.....	5.49	
Benkleman	.....	.....	.....	2.28	
Blair	91	46	71.0	11.52	
Bluehill	.....	.....	.....	5.79	
Bradshaw	.....	.....	.....	9.57	
Bridgeport	95	44	70.5	3.15	
Brokenbow	93	46	69.9	6.16	
Burchard	.....	.....	.....	10.64	
Burwell	.....	.....	.....	5.18	
Callaway	92	49	70.0	4.28	
Cedar Rapids	91°	49°	66.6°	4.67	
Central City	.....	.....	.....	4.81	
Chester	.....	.....	.....	3.22	
Cody	.....	.....	.....	4.74	
Columbus	90	52	70.2	8.33	
Crete	91	50	71.5	6.47	
Culbertson	100	44	70.3	2.69	
David City	88	50	69.6	6.90	
Dawson	93	48	72.7	8.73	
Edgar	.....	.....	.....	5.46	
Ericson	.....	.....	.....	6.60	
Ewing	.....	.....	.....	5.80	
Fairbury	96	46	71.0	2.95	
Fairmont	91	46	70.3	6.45	
Fort Robinson	99	40	70.4	2.53	
Franklin	94	43	70.8	5.17	
Fremont	91	48	70.2	11.08	
Geneva	93	45	71.4	3.69	
Genoa (near)	89	42	70.1	7.12	
Gosper	.....	.....	.....	4.31	
Gothenburg	95	48	70.6	5.09	
Grand Island *a*	.....	.....	.....	5.70	
Grand Island *b*	94	48	71.6	6.25	
Greeley	.....	.....	.....	5.00	
Guide Rock	.....	.....	.....	3.86	
Halsey	100	40	72.2	1.74	
Hartington	91	48	68.2	6.17	
Harvard	89	48	70.2	4.32	
Hastings *1	91	54	72.0	9.86	
Hayes Center	.....	.....	.....	2.74	
Hay Spring	91f	41f	66.1f	2.22	
Hebron	91	48	72.0	8.39	
Hickman	.....	.....	.....	7.75	
Holbrook	.....	.....	.....	2.45	
Holdrege	93j	50j	72.0j	4.90	
Hooper *1	90	54	69.9	9.20	
Imperial	99	44	72.2	2.67	
Johnstown	.....	.....	.....	4.53	
Kearney	92	50	71.0	7.19	
Kennedy	95	45	69.3	2.29	
Kimball	94	44	69.3	2.69	
Kirkwood	95	44	68.0	3.66	
Leavitt	96	48	71.9	10.34	
Lexington	93	49	69.4	5.42	
Lockridge	94	48	70.8	6.28	
Lodgepole	95	41	69.0	2.80	
Loup	94	45	70.8	6.06	
Lynch	95	47	71.2	3.67	
Lyons	.....	.....	.....	8.57	
McCook	.....	.....	.....	2.01	
McCool Junction	.....	.....	.....	5.05	
Madison	88	48	69.1	8.64	
Madrid	94e	40f	68.9f	2.03	
Marquette	.....	.....	.....	7.39	
Mason	.....	.....	.....	4.17	
Minden	91	49	70.0	8.16	
Monroe	.....	.....	.....	7.38	
Nebraska City *c*	93	46h	71.2d	6.36	
Nemaha	.....	.....	.....	8.65	
Norfolk	91	47	70.3	7.10	
North Loup	91	36	70.0	5.06	
Oakdale	90	50	69.8	5.01	
Odell	.....	.....	.....	8.57	
O'Neill	94	44	70.2	4.44	
Ord	.....	.....	.....	4.21	
Osceola	.....	.....	.....	7.27	
Palmer	.....	.....	.....	11.55	
Palmyra *1	92	52	70.7	7.10	
Pawnee City	.....	.....	.....	8.15	
Plattsmouth *b*	.....	.....	.....	6.74	
Purdum	96	46	70.2	1.86	
Ravenna *a*	91	48	70.8	7.62	
Redcloud	92	50	72.2	6.76	
Republican	.....	.....	.....	4.51	
Rulo	.....	.....	.....	6.90	
St. Libory	.....	.....	.....	7.81	
St. Paul	92	47	71.4	10.04	
Salem	.....	.....	.....	7.45	
Santee	94	48	70.9	4.52	
Schuyler	.....	.....	.....	7.48	
Seward	95	53	73.6	3.61	
Smithfield	.....	.....	.....	6.34	
Spragg	.....	.....	.....	2.07	
Springview	93	44	69.2	4.02	
Stanton	88	47	68.2	8.20	
Stromsburg	.....	.....	.....	5.09	
Strang	.....	.....	.....	3.75	
Stratton	.....	.....	.....	2.96	
Superior	98	49	72.4	2.17	
Syracuse	.....	.....	.....	6.84	
Tablerock	.....	.....	.....	7.76	
Tecumseh *c*	.....	.....	.....	8.36	
Tekamah	94	50	72.0	12.12	
Turlington	91	50	71.2	5.69	
University Farm	92	47	71.3	5.98	
Wahoo	.....	.....	.....	6.36	
Wakefield	90	45	69.3	6.37	
Wallace	.....	.....	.....	3.24	
Wauneta	.....	.....	.....	2.26	
Weeping Water	.....	.....	.....	5.61	
Westpoint	93	48	70.8	11.47	
Wilber	.....	.....	.....	9.69	
Willard	.....	.....	.....	2.90	
Wilsonville	.....	.....	.....	2.78	
Winnebago	89	42	67.8	6.64	
Wisner	.....	.....	.....	7.15	
Wymore	.....	.....	.....	7.14	
York	95	49	71.3	3.32	
Nevada.					
Austin	88	39	67.6	0.30	
Battle Mountain	106	38	71.5	0.00	
Belmont	91	41	67.9	0.00	
Beowawe *1	104	47	73.0	0.00	
Caliente	105	44	76.6	0.00	
Candelaria	94	47	73.9	0.02	
Carlin *1	88	40	65.6	0.00	
Carson City	94	36	64.7	T.	
Cranes Ranch	.....	.....	.....	0.14	
Dyer	97	32	67.6	0.00	
Elko	100	33	66.4	T.	
Ely	94	36	68.4	0.18	
Eureka	95	38	71.1	T.	
Fallon	97	40	69.4	0.00	
Fencion *1	95	53	71.7	0.05	
Golconda *1	98	45	76.4	T.	
Halleck *1	101	46	72.9	T.	
Hawthorne	100	47	73.4	0.00	
Humboldt	96	38	69.4	T.	
Lee	.....	.....	.....	0.30	
Lewers Ranch	94	36	67.2	0.09	
Martins	98	34	72.2	0.00	
Mill City *1	100	50	71.7	0.00	
Morey	103	42	72.4	0.05	
Palisade	100	42	76.2	0.18	
Palmetto	92	37	65.8	0.18	
Potts	100	28	63.8	0.20	
Reno State University	93	38	67.3	0.01	
Rioville	114	66	91.6	0.58	
Silverpeak	102	49	77.8	0.00	
Sodaville	107	49	78.8	0.05	
Tecoma	99	35	70.0	0.00	
Wabuska	98	32	66.7	T.	
Wadsworth *1	99	40	63.7	0.00	
Wells *1	92	45	68.5	0.00	
Wood	93	36	66.0	0.11	
New Hampshire.					
Alstead	78	40	60.4	6.29	
Berlin Mills	82	37	58.1	4.26	
Bethlehem	.....	.....	.....	2.11	
Brookline *1	82	40	63.0	2.99	
Chatham	84	37	58.2	3.95	
Concord	82	41	60.6	3.70	
Durham	83	45	62.2	2.67	
Franklin Falls	78	43	59.7	4.01	
Grafton	80	34	58.2	3.19	
Hanover	79	38	60.4	3.80	
Keene	83	37	61.0	4.27	
Nashua	86	43	63.0	2.84	
Newton	82	40	61.0	3.12	
Plymouth	80	41	61.4	3.28	
Sanbornton	79	37	59.4	3.82	
Stratford	83	36	59.0	2.70	
New Jersey.					
Asbury Park	93	51	68.9	8.59	
Barnegat	95	44	68.8	7.56	
Bayonne	91	50	68.8	6.30	
Belvidere	90	47	67.2	5.90	
Bergen Point	89	49	67.8	7.12	
Beverly	93	48	70.6	4.39	
Blairstown	90	43	66.4	6.79	
Bridgeton	98	51	72.3	6.64	
Camden	95	56	71.2	6.03	
Canton	.....	.....	.....	5.03	
Cape May C. H	92	50	70.9	9.05	
Charlotteburg	87	39	64.2	7.78	
Chester	88	45	65.0	9.35	
Clayton	91	49	69.2	4.30	
College Farm	92	46	68.4	5.97	
Dover	86	42	63.8	9.04	
Elizabeth	91	48	68.2	7.15	
Flemington	92	41	68.5	5.36	
Friesburg	94	49	70.2	6.72	
Hightstown	90	49	68.6	4.42	
Imlaystown	91	50	70.1	5.41	
Indian Mills	97	51	70.2	5.14	
Lakewood	90	48	67.2	8.77	
Lambertville	91	48	69.0	5.00	
Layton	88	39	64.0	6.19	
Moorestown	92	49	69.2	5.49	
Newark	90	50	67.8	14.54	
New Brunswick	92	48	69.2	6.52	
Newton	88	42	66.6	7.51	
Oceanic	90	52	67.8	7.87	
Paterson	91	48	68.0	10.98	
Pemberton	92	47	69.4	5.49	
Perth Amboy	93	57	71.0	7.24	
Phillipsburg	92	48	68.2	5.87	
Plainfield	91	45	68.2	6.87	
Pleasantville	.....	.....	.....	7.73	
Rancocas	.....	.....	.....	5.86	
Ringwood	90	42	64.4	6.17	
Rivervale	88	44	66.4	9.40	
Salem	90	47	71.0	5.58	
Somerville	92	43	67.8	5.15	
South Orange	87	49	66.5	13.57	
Sussex	85	45	65.0	8.06	
Toms River	95	45	68.4	6.76	
Trenton	89	59	70.3	5.50	
Tuckerton	95	45	70.1	6.55	
Vineland	96	49	69.2	7.86	
Woodbine	93	47	69.2	6.97	
Woodstown	.....	.....	.....	4.60	
New Mexico.					
Alamagordo	108	48	81.0	1.48	
Albert	100	57	77.6	2.24	
Albuquerque	99	45	74.2	.....	
Alma	100	45	74.1	2.72	
Arabela	95	55	73.2	1.74	
Bellranch	.....	.....	.....	2.15	
Cambray	.....	.....	.....	2.58	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Mexico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Carlsbad	102e	54c	82.1e	0.48	
Cloudcroft	73	42	57.2	2.98	
Deming				0.40	
Dorsey	92	47	69.0	1.52	
Engle	98	55	75.4	0.22	
Eagle Rock Ranch	91	48	67.4	2.58	
Fort Stanton	93	48	69.0	1.55	
Fort Union	97	45	68.3	2.02	
Gage				0.72	
Gallisteo	91	55	72.0	1.80	
Gallinas Springs	96	55	75.5	1.42	
Golden				1.56	
Las Vegas	94	45	68.8	3.57	
Lordsburg				0.70	
Los Lunas	98	45	71.8	0.35	
Luna	94	39	66.8	5.60	
Mesilla Park	100	55	78.0	1.50	
Mountainair	95	48	70.4	1.71	
Raton	94	48	70.4	2.12	
San Marcial	108	55	80.6		
Strauss				4.51	
Taos	97	46	68.9f	2.26	
Winsors	82	31	58.4	4.39	
New York.					
Adams				3.05	
Addison	90	41	64.4	7.25	
Akron				7.27	
Alden	82	43	65.8	5.76	
Amsterdam	84	44	61.8	8.58	
Angelica	87	37	64.6	7.51	
Appleton	85	45	63.9	5.07	
Athens	85	47	63.8	7.83	
Atlanta	86	39	62.6	5.58	
Auburn	85	45	64.2	5.14	
Avon	85	41	63.8	7.07	
Axton	77	39	55.5	4.72	
Baldwinsville	85	46	63.9	5.85	
Beaver	79	31	57.0	3.70	
Bedford	86	44	65.6	8.42	
Berlin	84	40	60.3	6.13	
Blue Mountain Lake				5.00	
Bouckville	80	41	60.8	5.91	
Boyds Corners				9.10	
Brockport	86	45	65.0	4.35	
Caldwell	80	40	61.0	6.20	
Canajoharie	80	41	61.0	5.59	
Canaan Four Corners	81	40	59.6	7.30	
Carmel	83	43	64.3	8.29	
Carvers Falls	79	42	60.4	3.57	
Chazy	84	42	61.7	4.17	
Clockville				4.51	
Cooperstown	80	41	60.4	7.26	
Cortland	84	40	64.0	8.21	
Cutchogue	85	50	66.0	7.77	
Dekalb Junction	82	45	62.4	4.15	
De Ruyter	83	38	60.0	5.54	
Easton				5.97	
Elba	80	46	63.1	5.14	
Elmira	92	43	65.8	6.28	
Fayetteville	85	46	64.2	4.48	
Franklinville	83	37	62.6	5.20	
Gabriels	80	30	55.2	5.02	
Gansevoort				6.18	
Glens Falls	80	39	62.1	5.06	
Gloversville	81	41	60.4	6.78	
Greenwich	81e	40e	61.8e	6.33	
Griffin Corners	82	34	57.9	6.09	
Harkness	81	43	60.4	2.51	
Haskinville				4.97	
Hemlock	83	48	65.4	6.02	
Homer	84	39	61.0	7.63	
Honeymead Brook	82	42	62.6	8.26	
Indian Lake	81	31	55.7	4.83	
Ithaca	86	45	63.6	7.15	
Jamestown	87	49	65.8	5.32	
Jeffersonville	88	38	62.8	5.32	
Keene Valley	81	38	58.5	3.45	
King Ferry				6.70	
Liberty	84	42	59.8	6.55	
Littlefalls, City Res.	78	45	60.9	7.23	
Lockport	82	48	65.0	5.55	
Lowville	82	41	59.8	3.34	
Lyndonville				7.40	
Lyons	87	45	66.2	5.27	
Middletown	84	45	64.2	9.04	
Mohonk Lake	80	48	61.0	10.80	
Moira	81	42	62.0	3.91	
Mount Etrick	85	45	61.6	10.33	
Newark Valley				8.66	
New Lisbon	83	34	58.6	6.54	
North Hammond	80	52	65.3	5.34	
North Lake				4.99	
Number Four	77	37	57.8	4.18	
Ogdensburg	76	41	62.8	4.86	
Old Chatham				7.82	
Oneonta	85	40	63.0	7.70	
Oswegatchie	79	40	59.8	3.51	
Otto	84	42	65.0	4.79	
Oxford	84	40	61.6	7.89	
Oyster Bay	88	46	67.4	6.45	
Palermo				4.01	
Penn Yan	88	48	65.6	4.51	
Perry City	85	39	61.7	8.60	
Port Jervis	90	44	64.6	8.25	
Potsdam	81	43	62.2	3.17	
Primrose	89	46	65.9	10.51	
Redhook				8.51	
Richmondville	82	42	60.9	5.66	
Ridgeway	80	49	64.6	6.71	
Rome	84	45	63.5	3.46	
Romulus	85	48	65.0	4.88	
Salisbury Mills				11.20	
Saranac Lake	77	38	57.4	3.07	
Saratoga Springs	81	40	60.6	7.42	
Scottsville				5.01	
Setauket	84	55	66.4	6.28	
Shokan				9.91	
Shortsville	84	45	64.2	5.29	
Skaneateles				5.74	
Southampton	80	53	66.4	7.37	
South Butler	85	43	64.4	5.43	
South Canisteo	87	39	62.6	7.13	
Southeast Reservoir				6.88	
South Kortright	83	34	59.4	5.44	
South Schroon	77	38	57.9	5.01	
Speer Falls	82	41	61.6	5.34	
Straits Corners	88e	37e	61.2e	5.96	
Ticonderoga	82	45	62.4	3.41	
Volusia	82	44	63.2	5.18	
Walton	86	38	61.0	7.42	
Wappinger Falls	84	45	63.7	11.87	
Warwick				6.84	
Watertown	83	46	63.5	3.15	
Waverly	90	39	64.3	6.52	
Wedgwood	88	45	63.0	10.34	
Wells	78	35	58.5	6.29	
West Berne	83	38	59.4	6.41	
Westfield *b*	86	46	65.4	4.95	
Windham	84	38	60.5	6.97	
Youngstown				6.61	
North Carolina.					
Brewers	98	57	74.2	5.11	
Brevard	94e	55e	74.4e	3.37	
Bryson City				2.90	
Currituck				2.43	
Edenton	95	62	79.6	4.70	
Fayetteville	97	63	78.6	5.51	
Flatrock	92	54	73.1	6.13	
Goldsboro	96	64	78.4	4.40	
Graham				2.93	
Greensboro	95	62	75.7	5.06	
Henderson	97	64	77.5	11.26	
Hendersonville	93	56	73.4	5.56	
Henrietta	98	63	78.9	3.53	
Highlands	83	47	65.2	3.87	
Horse Cove	86	58	71.6	6.42	
Jefferson	88	52	70.0	3.17	
Kinston	97	62	79.6	6.93	
Lenoir	94	58	75.0	4.87	
Linville	84	45	65.0	4.15	
Littleton	99	62	75.6	7.49	
Louisburg	98	63	77.6	5.89	
Lumberton	99	65	80.5	3.55	
Marion	96	60	76.0	6.49	
Mocksville	96	62	76.4	6.75	
Moncure	98	60	76.9	4.41	
Monroe	98	62	78.6	4.62	
Morganton	96	61	75.9	5.20	
Mountairy	93	59	74.4	4.51	
Murphy				3.36	
Nantahala Park	84	50	66.0	2.30	
Newbern	97	62	79.3	9.01	
Patterson *g*	93	60	69.4	3.71	
Penelo	99e	62e	79.0e	5.01	
Pittsboro	101e	60e	77.5e	3.84	
Reidsville	97	60	76.4	2.60	
Rockingham	98	64	79.4	6.13	
Roxboro	97	59	75.6	4.50	
Salem	95	62	76.4	2.90	
Salisbury	99	64	79.2	3.23	
Saxon	96	60	74.8	4.53	
Selma	102	63	80.2	3.35	
Settle *g*	98	64	78.4	4.50	
Sloan	100	61	79.0	11.16	
Soapstone Mount	96	61	76.0	4.80	
Southern Pines *a*	100	64	79.4	3.58	
Southern Pines *b*	99	65	79.1	2.28	
Southport	95	69	81.4	5.72	
Springhope	98	65	79.6	4.18	
Statesville	96	61	75.8	3.04	
Tarboro	100	63	80.3	7.43	
Washington	99	58	79.4	9.07	
Weldon *a*	101	62	78.8	6.14	
Weldon *b*				6.43	
Whiteville	98	60	80.0	6.36	
North Dakota.	°	°	°	*Ins.*	*Ins.*
Amenia	95	41	64.2	5.47	
Ashley	95	38	62.6	4.95	
Berlin	95	35	63.4	6.22	
Buxton	93	41	64.2	4.93	
Churchs Ferry	96	36	62.9	2.74	
Coalharbor	96	42	67.4	4.39	
Devils Lake	96	37	63.8	4.64	
Dickinson	96	37	66.2	5.52	
Donnybrook				5.21	
Dunseith	89	42	62.0	3.54	
Edgeley	98	41	65.5	5.31	
Elbowoods	97	37	65.6	4.44	
Fargo	92	37	62.2	4.61	
Forman	94	42	64.8	4.51	
Fort Yates				5.15	
Fullerton	93	38	63.6	4.27	
Glenullin	97	38	64.6	3.52	
Grafton	89	43	62.8	6.75	
Hamilton	85	36	62.6	6.31	
Jamestown	98	38	65.8	3.96	
La Moure				4.58	
Langdon	92	36	59.8	3.11	
Larimore	96	36	61.9	4.97	
Lisbon	96	40	64.5	4.88	
McKinney	96	37	61.9	3.65	
Manfred	94	35	62.9	5.14	
Mayville	96	36h	59.6h	4.60	
Medora	94	36	65.9	4.93	
Melville	97	36	66.6	3.87	
Milton	89	40	61.8	4.76	
Minnewaukon	96	39	63.8	3.16	
Minot	103	43	66.6	5.05	
Minto	94	37	62.8	4.78	
Napoleon	98	36	65.2	5.71	
New England	93	35	63.2	3.90	
Oakdale	92	39	64.0	4.00	
Pembina	84	38	61.2	4.09	
Portal	92	41	59.4	5.40	
Power	93	43	64.6	4.29	
Steele	93	38	63.2	6.14	
University	93	40	61.9	4.02	
Wahpeton	91	44	65.5	3.59	
Willow City	92	35	61.9	3.92	
Ohio.					
Akron	91	46	67.7	7.05	
Atwater				6.50	
Bangorville	95	47	70.3	2.94	
Bellefontaine	95	51	70.6	1.91	
Bement				3.88	
Bladensburg	96	44	70.2	0.95	
Bloomingburg				1.07	
Bowling Green	94	45	69.2	4.42	
Bucyrus	95	46	69.3	2.30	
Cambridge	96	46	71.2	2.02	
Camp Dennison	98	50	73.4	3.28	
Canal Dover	95	44	69.5	3.02	
Canton	93	46	71.0	6.55	
Cardington	97	42	69.6	1.82	
Cedarville				0.69	
Chillicothe	98	50	74.6	1.05	
Circleville	96	51	73.6	0.91	
Clarington	97	50	73.2	1.40	
Clarksville	96	54	73.9	0.84	
Cleveland *a*	85	50	70.0	3.89	
Cleveland *b*	87	48	67.1	3.41	
Clifton	95	52	72.7	0.31	
Coalton	99	46	73.0	1.27	
Colebrook	89f	41e	64.9f	9.33	
Dayton *a*				1.00	
Dayton *b*	99	52	74.3	1.17	
Defiance	95	46	68.8	4.25	
Delaware	97	46	71.6	2.40	
Elyria	91	46	68.2	5.20	
Findlay	99	48	71.2	4.31	
Frankfort	94	47	71.3	0.97	
Fremont	92	49	69.3	4.91	
Garrettsville	91e	42	67.0e	5.57	
Granville	96	45	72.0	1.50	
Gratiot	95	46	70.9	0.88	
Green	98	51	74.4	1.25	
Greenfield	93	54	73.6	1.55	
Greenhill	93	40	66.9	4.97	
Greenville	93	52	71.6	2.33	
Hanging Rock	99	51	75.4	0.60	
Hedges	95	45	69.2	4.32	
Hillhouse	87	41	65.4	4.69	
Hiram	88	48	67.2	4.62	
Hudson	91	42	67.8	8.66	
Jacksonboro	99	50	74.4	3.43	
Kenton	98	47	72.1	3.05	
Killbuck	95	44	70.4	2.38	
Lancaster	96	48	71.6	0.79	
Lima	95	50	71.4	1.96	
McConnelsville	96	48	72.3	1.04	
Manara	96	48	71.8	0.54	
Mansfield				3.13	
Marietta	93	52	73.6	2.25	
Marion	98	46	71.3	2.29	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Medina	95	43	69.3	4.66	
Milfordton	96	43	70.4	1.29	
Milligan	96	43	70.3	1.68	
Millport	94	41	67.4	4.27	
Montpelier	92	48	67.4	5.39	
Napoleon	93	50	69.6	5.64	
New Alexandria	95	47	71.6	2.55	
New Berlin	94	42	68.8	6.31	
New Bremen	96	49	71.5	2.51	
New Richmond	96	55	74.5	2.55	
New Waterford	94	46	69.2	5.72	
North Lewisburg	94	48	71.6	1.05	
North Royalton	89	42	68.2	7.49	
Norwalk	96	45	69.0	3.52	
Oberlin	97	38	69.4	5.07	
Ohio State University	95	48	71.5	0.56	
Orangeville	90	41	67.2	6.34	
Ottawa	94	48	72.4	3.88	
Pataskala	97	49	71.8	0.87	
Philo	98	48	73.3	1.52	
Plattsburg	95	50	72.4	0.33	
Pomeroy	96	49	73.2	1.86	
Portsmouth *a*				2.26	
Portsmouth *b*	96	54	75.0	1.98	
Pulse	95	53	73.8	1.42	
Richwood	96	42	70.8	1.87	
Ripley	94	52	72.6	2.52	
Rittman	97	43	70.2	4.34	
Rockyridge	95	48	70.1	8.42	
Shenandoah	93	44	68.4	2.48	
Sidney	95	49	72.2	2.43	
Somerset	96	50	73.0	1.37	
Springfield				0.49	
Strongsville				8.70	
Thurman	101	50	75.2	2.54	
Tiffin	92	49	69.6	4.66	
Urbana	89	51	68.9	1.78	
Vickery	92	45	68.4	7.14	
Walnut				1.03	
Warren	91	43	69.0	3.94	
Warsaw	100	40	71.0	0.97	
Wauseon	96	45	69.1	4.84	
Waverly	100	49	74.6	1.35	
Wellington	96	45	67.6	3.92	
Willoughby				4.50	
Wilson	97	46	73.2	1.27	
Wooster	92	43	68.8	6.58	
Zanesville				1.10	
Oklahoma.					
Arapaho	104	62	83.0	0.87	
Beaver	105	54	78.8	4.79	
Binger	101	55	79.9	2.73	
Blackburn	100	48	76.6	5.80	
Chandler	97	61	79.2	4.33	
Clifton	101	45	79.8	2.07	
Cloud Chief	101	61	81.2	1.37	
Eldorado	104	62	84.3	0.40	
Enid	100	56	79.4	0.62	
Fort Reno	102	60	80.6	3.15	
Fort Sill	104	59	81.7	3.96	
Grand	105	58	82.1	0.33	
Guthrie	98	57	77.9	2.89	
Hennessey	101	57	81.6	0.99	
Hobart	104	53	80.2	1.24	
Jefferson	100	40	79.4	1.53	
Jenkins	99	55	78.6	2.81	
Kenton	103	54	77.8	0.85	
Kingfisher	102	59	81.7	1.60	
Leger	105	62	82.4	1.04	
McComb	99	56	79.6	3.31	
Mangum	104	60	84.2	2.05	
Newkirk	104	50	79.1	5.59	
Norman	105	57	81.4	2.24	
Okeene	103	56	84.4	1.20	
Pawhuska	98	53	76.1	5.77	
Perry	100	58	78.9	2.64	
Sac and Fox Agency	100	60	81.0	3.90	
Shawnee	99	61	80.4	5.21	
Stillwater	98	60	79.2	2.48	
Taloga	108	59	83.8	1.08	
Temple	105	60	84.1	2.25	
Waukomis	106	58	81.4	1.22	
Weatherford	101	58	80.4	0.80	
Woodward [1]	96	42	78.6	1.18	
Oregon.					
Albany				0.63	
Alpha	91	38	61.4	1.44	
Arlington	98	51	72.7	0.25	
Ashland	93	40	66.2	0.26	
Astoria	76	50	61.3	0.96	
Aurora (near)	85	44	62.8	0.93	
Bay City	77	43	58.8	1.74	
Beulah	101	35	66.6	0.36	
Blackbutte	90	42	63.4	0.70	
Blalock	105[e]	51	78.7	0.11	
Bullrun				2.04	
Cascade Locks	94	49	66.7	0.47	
Coquille				0.27	
Corvallis	92	42	64.0	0.44	
Coyote	109	48	73.6	2.12	
Dayville	96	41	66.0	0.36	
Deschutes	95	28	59.8	0.20	
Detroit	102	39	68.5	0.09	
Doraville	87	46	61.3	2.31	
Drain	96	39	65.2	0.87	
Ella				0.63	
Eugene	89	45	64.6	1.22	
Fairview	85	38	61.7	0.90	
Falls City	88	40	61.3	0.56	
Forestgrove	92	39	63.5	0.99	
Glenora	95	43	62.4	1.31	
Gold Beach	81	45	62.2	0.65	
Government Camp	84	36	53.3	2.54	
Grants Pass	98	39	67.5	0.90	
Grass Valley	95			0.40	
Hood River (near)	94	45	66.0	0.31	
Huntington	102	48	76.9	1.05	
Jacksonville	95	44	68.8	0.47	
Joseph	95	32	61.4	1.30	
Kerby	105	40	65.6	0.46	
Lagrande	99	37	67.0	0.98	
Lakeview	99	31	64.8	0.32	
Langlois	75	41	59.3	1.37	
Lonerock	95	38	63.2	0.70	
McKenzie Bridge	96	36	62.6	1.64	
McMinnville [e]	91	41	63.8	0.20	
Monroe	89	44	64.6	1.24	
Mount Angel	88	48	65.1	0.88	
Nehalem				1.29	
Newport	73	45	57.9	1.08	
Pine	98	35	64.2	0.96	
Prineville	94	33	61.6	0.43	
Riverside				0.52	
Salem	87	46	65.4	0.29	
Sparta	99	41	69.0	1.80	
Stafford	90	44	64.3	0.67	
The Dalles	95	49	69.7	0.11	
Toledo	86	45	61.2	1.24	
Umatilla	108	49	74.6	0.42	
Vale	102	36	68.0	0.59	
Wallowa	97	32	61.5	1.75	
Wamic	95	37	63.4	0.19	
Warm Spring	100	41	67.0	0.21	
Weston	99	42	66.2	2.16	
Williams	95	37	64.9	0.38	
Pennsylvania.					
Aleppo	94	43	70.4	2.54	
Altoona	91[f]	41[e]	66.2[e]	5.08	
Athens	93	41	64.2	5.79	
Beaver Dam				7.61	
Bellefonte	91	46	68.8	5.50	
Brookville				5.70	
Browers				4.99	
Butler	89	42	67.7	6.49	
California	99	48	72.4	2.36	
Cassandra	85	40	65.0	4.15	
Centerhall	90	43	65.8	6.61	
Clarion				6.76	
Coatesville	97	48	70.2	4.94	
Coudersport	85	39	62.3	4.71	
Confluence				3.22	
Davis Island Dam				5.37	
Derry	92	43	69.9	5.19	
Doylestown				4.82	
Dushore	88	36	62.2	5.29	
East Bloomsburg				4.50	
East Mauch Chunk	93	43	66.8	5.29	
Easton	90	47	67.4	5.42	
Ellwood Junction				4.10	
Emporium	87	44	65.4	5.92	
Ephrata	92	47	68.8	7.13	
Everett	92	49	67.5	4.72	
Forks of Neshaminy				4.71	
Franklin	88	42	66.8	6.02	
Freeport	94	46	72.2	6.07	
Gettysburg	96	50	70.4	7.08	
Girardville				5.15	
Gordon	89	42	65.4	5.47	
Grampian				4.94	
Greensboro				4.04	
Greenville	91	40	66.9	4.73	
Hamburg	91	46	68.4	5.34	
Hamlinton	87	43	62.0	7.85	
Hawthorn	91	44	67.1	6.17	
Herrs Island Dam				4.65	
Huntingdon *a*				5.34	
Huntingdon *b*	94	45	67.1	6.43	
Indiana	90	44	68.0	5.15	
Irwin	94	43	70.6	6.36	
Johnstown	92	46	69.9	7.21	
Keating				5.57	
Kennett Square	92	50	68.6	5.08	
Lawrenceville	92	41	64.6	5.31	
Lebanon	93	47	68.6	7.28	
Leroy	88	44	63.1	4.49	
Lewisburg	89	47	67.4	5.21	
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lockhaven *a*	95	47	68.2	6.37	
Lockhaven *b*				6.38	
Lock No. 4				2.00	
Lycippus	90	49	70.0	3.75	
Marion	93	48	68.4	6.02	
Mifflin				7.11	
Mifflintown	92	45	67.6	6.24	
Milford	90	40	63.8	7.03	
New Germantown	94	47	67.4	5.53	
Oil City				4.32	
Ottsville				5.08	
Parker				4.80	
Philadelphia	94	56	71.2	5.40	
Pocono Lake	83	37	60.0	6.53	
Point Pleasant				5.07	
Pottsville				5.16	
Quakertown	91	45	68.5	4.61	
Reading	93	48	69.4	7.01	
Renova *a*	89	47	66.2	5.41	
Renovo *b*				5.47	
Saegerstown	87	39	65.5	8.05	
St. Marys	85	39	63.9	4.56	
Saltsburg				3.77	
Seisholtzville				4.94	
Selinsgrove	94	47	68.2	4.91	
Shawmont				3.84	
Smethport	86	37	63.5	6.14	
Smiths Corners				5.16	
Somerset	89	39	66.6	3.93	
South Bethlehem	88	47	66.8	4.88	
South Eaton	90	44	64.2	6.19	
Springmount				4.59	
State College	88	45	66.4	6.85	
Sunbury				2.72	
Swarthmore	94	49	69.6	7.54	
Towanda	90	42	64.4	4.63	
Troutrun				5.29	
Uniontown	95	47	71.4	3.25	
Warren	87	42	65.6	4.46	
Wellsboro	86	40	64.0	3.37	
Westchester	93	52	70.0	6.16	
West Newton				3.95	
Wilkesbarre	91	43	65.2	7.13	
Windber				6.60	
Williamsport	91	47	66.8	5.05	
York	95	50	69.6	6.96	
Rhode Island.					
Bristol	80[f]	52[f]	66.0[f]	3.52	
Kingston	85	45	64.1	6.55	
Pawtucket	85	51	67.3	4.15	
Providence *a*	88	52	67.4	3.92	
Providence *c*	84	49	64.6	4.24	
South Carolina.					
Allendale	99	69	82.4	4.83	
Anderson	100	65	80.3	5.34	
Batesburg	98	62	79.6	7.80	
Beaufort	97	70	81.9	6.57	
Bennettsville	102	65	81.2	4.52	
Blackville	100	67	81.6	5.89	
Bowman	101	66	81.4	7.43	
Calhoun Falls				1.10	
Camden				7.77	
Cheraw *a*	98	66	79.0	9.00	
Cheraw *b*				7.97	
Clarks Hill	102	67	82.3	3.05	
Clemson College	102[j]	63[h]	80.5[i]	4.41	
Conway	100	65	81.5	8.42	
Darlington	100	64	80.9	10.01	
Duewest	95[e]	67[e]	79.7[e]	3.15	
Edisto				8.16	
Effingham				7.20	
Florence	100	65	80.8	5.92	
Gaffney	105	64	80.8	3.30	
Gillisonville	99	69	81.7	6.24	
Greenville	93	63	75.6	4.05	
Greenwood	95	68	80.2	7.46	
Heath Springs	102	62	81.1	12.15	
Kingstree *a*	100	64	80.4	8.64	
Kingstree *b*				8.60	
Liberty	99	61	80.1	4.74	
Little Mountain	99	67	80.6	6.55	
Longshore	100	65	80.6	8.56	
Lugoff	101	64	80.6	7.01	
St. Georges	97	68	80.8	5.93	
St. Matthews	96	70	80.8	8.63	
St. Stephens				12.83	
Saluda	99	64	81.0	5.93	
Santuck	100	62	79.5	3.95	
Seivern	102	60	80.8	5.91	
Smiths Mills				8.30	
Society Hill	96	65	80.5	7.59	
Spartanburg	98	64	79.0	4.64	
Statesburg	96	66	80.0	7.52	
Summerville	95	68	79.8	7.59	
Sumter	102	65	81.8	6.64	
Temperance	98[i]	65[i]	80.6[i]	9.96	
Trenton	100	68	81.2	5.44	
Trial	96	64	78.8	10.99	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Walhalla	96	62	78.0	7.10	
Walterboro	98	68	81.0	7.17	
Winnsboro	99	64	81.1	3.36	
Winthrop College	97	65	79.6	4.37	
Yemassee	99	69	81.4	10.58	
Yorkville	99	66	81.3	5.82	
South Dakota.					
Aberdeen	97	42	68.6	6.59	
Academy	98	46	69.8	2.88	
Alexandria	95	42	68.6	1.93	
Armour	95	43	70.0	3.29	
Ashcroft	103	38	67.8	1.95	
Bowdle	106[1]	38[1]	68.2[1]	4.45	
Brookings	94	40	65.2	4.25	
Canton	89	40	67.3	6.07	
Cavite	104	43	71.0	1.55	
Centerville	.....	.....	.....	3.92	
Chamberlain	104	48	72.0	2.06	
Clark	92	40	66.2	5.74	
Clear Lake	89	42	65.6	5.48	
Desmet	97[m]	41[1]	68.0[1]	3.94	
Doland	93	38	67.9	2.76	
Elkpoint	97	47	71.9	4.99	
Fairfax	92	44	68.4	3.58	
Farmingdale	.....	.....	.....	2.82	
Faulkton	98	40	66.0	2.88	
Flandreau	89	41	65.2	4.30	
Forestburg	100	39	68.9	1.08	
Fort Meade	100	44	68.9	3.56	
Gannvalley	107	43	71.4	2.32	
Gettysburg	101	45	67.6	4.02	
Grand River School	101	41	67.5	6.53	
Greenwood	93	50	71.0	3.09	
Highmore	.....	.....	.....	2.40	
Hotch City	104	40	71.2	1.04	
Howard	91	42	67.8	3.90	
Howell	98	39	67.3	2.26	
Ipswich	96	40	66.7	6.03	
Kimball	94	45	68.4	1.76	
Leola	100	40	67.0	7.58	
Leslie	106	40	69.7	3.12	
Marion	90	45	67.9	4.42	
Mellette	95	39	67.0	4.32	
Millbank	90	43	66.8	3.66	
Menno	90	45	68.9	2.10	
Mitchell	96	42	69.3	1.39	
Oelrichs	103	39	70.1	1.05	
Pedro	110	44	72.2	2.65	
Plankinton	94	44	69.0	3.06	
Ramsey	90[o]	40[o]	65.6[o]	1.92	
Redfield	95	39	66.7	2.04	
St. Lawrence	100	40	69.3	2.38	
Silver City	.....	.....	.....	1.83	
Sioux Falls	87	45	67.0	5.13	
Sisseton Agency	86	42[c]	63.7[c]	2.92	
Spearfish	93	45	67.6	3.73	
Tyndall	93	45	69.3	4.29	
Vermilion	91	49	70.2	5.44	
Watertown	89	39	64.4	5.71	
Wentworth	90	41	66.4	3.48	
Wolsey	.....	.....	.....	1.23	
Tennessee.					
Andersonville	92	53	73.5	4.77	
Arlington	98	54	78.5	4.31	
Ashwood[m]	97	52	78.2	.....	
Benton	95	55	76.4	3.79	
Bluff City	.....	.....	.....	5.30	
Bolivar	94	55	78.0	3.74	
Bristol	92	58[d]	76.8[d]	1.55	
Brownsville	96	55	78.0	4.53	
Byrdstown	93	52	74.6	3.21	
Carthage	96	53	78.0	4.05	
Clinton	.....	.....	.....	3.56	
Covington	95	58	78.8	3.55	
Decatur	96	55	77.0	5.43	
Dickson	93	52	75.2	4.50	
Dyersburg	98	56	79.6	0.48	
Elizabethton	92	58	74.8	4.48	
Florence	94	55	76.8	4.35	
Franklin	94	56	77.6	2.90	
Grace[s1]	96	58	79.6	7.10	
Greeneville	90	57	73.4	7.53	
Halls Hill	.....	.....	.....	3.79	
Harriman[r]	93	57	75.7	4.08	
Hohenwald	98	45	75.6	1.97	
Iron City	97	52	77.6	5.26	
Isabella	93	59	76.8	3.06	
Jackson	96	49	77.5	1.65	
Johnsonville	99	51	78.8	1.40	
Jonesboro	91	58	74.4	3.30	
Kenton	98	50	78.2	1.44	
Kingston	.....	.....	.....	6.40	
Leadvale	.....	.....	.....	4.85	
Lebanon	99	58	79.0	3.21	
Lewisburg	97	53	78.6	2.90	
Liberty	99	52	77.7	3.31	
Lynnville	94	53	77.2	2.36	
McKenzie	97	59	79.6	1.00	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Tennessee—Cont'd.	°	°	°	*Ins.*	*Ins.*
McMinnville	93	52	76.0	6.09	
Maryville	95	60	77.5	3.42	
Milan	96	51	78.0	1.58	
Newport	91	61	76.1	5.39	
Nunnelly	93	.....	.....	4.32	
Oakhill	92	53	73.2	6.90	
Palmetto	96	55	78.2	2.57	
Pope	99	50	78.4	2.75	
Rogersville	92	58	75.2	3.66	
Rugby	94	49	73.8	5.15	
Savannah	97	53	79.4	4.04	
Sewanee	89	54	74.4	2.39	
Silverlake	85	53	69.2	3.96	
Springdale	96	56	76.0	3.58	
Springville	98	52	78.8	1.03	
Tazewell	.....	.....	.....	3.77	
Tellico Plains	96	58	77.3	4.23	
Trenton	96	48	78.4	1.33	
Tullahoma	95	51	77.0	6.05	
Union City	96[j]	55[k]	78.3[j]	2.60	
Waynesboro	98	55	78.5	2.47	
Yukon	94	56	77.8	2.23	
Texas.					
Albany	98	58	82.4	1.77	
Alvin	96	72	83.5	8.93	
Anson	.....	.....	.....	2.35	
Arthur	.....	.....	.....	2.80	
Austin *a*	98	68	82.6	0.79	
Austin *b*[s5]	98	67	81.2	.....	
Ballinger	100	60	81.7	2.79	
Beaumont	99	68	82.6	4.76	
Beeville	100	70	83.4	1.96	
Bigspring	104	65	83.9	0.79	
Blanco	96	63	79.2	1.03	
Boerne[s1]	99	67	78.8	0.58	
Bonham	110	63	82.0	4.05	
Booth	.....	.....	.....	6.78	
Bowie	104	65	83.8	0.64	
Brazoria	93[k]	71[k]	81.1[k]	5.38	
Brenham	96	69	81.9	1.32	
Brighton	90	71	82.5	1.89	
Brownwood	104	61	85.0	0.80	
Burnet	100	64	81.2	1.13	
Camp Eagle Pass	104	70	90.3	0.40	
Childress	103	63	83.6	0.94	
Clarksville	96[k]	61[k]	80.3[k]	3.44	
Coleman	96	60	81.0	1.05	
College Station	110	65	83.2	1.28	
Colorado	106	59	83.6	3.29	
Columbia	93	70	81.6	7.17	
Comanche	102	58	81.6	1.53	
Corsicana	102	62	83.8	1.44	
Cotulla	104	73	89.0	3.29	
Cuero	96	69	82.4	2.81	
Dallas	102	63	82.6	1.05	
Danevang	98	66	82.1	3.80	
Dialville	96	67	80.2	2.94	
Dublin	100	65	82.0	2.50	
Duval	93	69	80.6	0.75	
Estelle	102	66	83.1	1.02	
Fort Brown	97	73	84.0	3.45	
Fort Clark	96	63	79.0	0.63	
Fort Davis	94	54	73.8	2.00	
Fort McIntosh	100	68	84.6	0.75	
Fort Ringgold	100	70	84.4	2.40	
Fredericksburg	96[d]	62[d]	79.8[d]	3.53	
Gainesville	100[o]	60	81.4	1.37	
Gatesville	102	55	82.6	2.30	
Grapevine	103	66	83.8	0.24	
Greenville	103	64	84.2	0.71	
Hale Center	92	60	77.6	3.88	
Hallettsville	95	70	82.2	2.39	
Haskell	109	63	85.8	0.46	
Hearne	99	64	86.8	1.03	
Henrietta	106	62	83.8	3.20	
Hewitt	.....	.....	.....	0.47	
Hillsboro	100	64	82.2	1.54	
Hondo	93	70	80.4	0.17	
Houston	95	70	82.0	6.46	
Huntsville	97	69	81.9	1.12	
Ira	104	62	82.2	1.07	
Jasper	95[k]	70[k]	82.0[k]	2.37	
Junction	.....	.....	.....	1.09	
Kaufman	100	69	84.3	0.80	
Kent	101	58	78.4	0.86	
Kerrville	95	56	77.2	0.38	
Kopperl	.....	.....	.....	1.38	
Lampasas	102	60	81.2	1.82	
Lapara	.....	.....	.....	1.70	
Liano	102	66	82.9	0.35	
Longview	98	65	83.6	2.18	
Luling	95	68	81.2	1.25	
McKinney	103[c]	58	80.6	0.34	
Mann	98	65	81.4	2.35	
Marlin	99	65	82.0	0.70	
Mount Blanco	98	57	78.8	1.33	
Nacogdoches	96	67	80.3	3.01	
New Braunfels[k]	93	71	80.8	3.19	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Panter	.....	.....	.....	2.17	
Pearsall	98	70	83.4	0.55	
Port Lavaca	92	68	82.6	17.69	
Rhineland	104	54	81.5	1.45	
Rockisland	96	68	80.9	2.66	
Rockport	92	72	82.0	0.60	
Runge	98	70	85.0	1.65	
San Saba	103	57	81.8	0.71	
Sherman	97	66	82.0	1.24	
Sonora	100	60	81.5	0.30	
Sugarland	95	67	82.2	5.19	
Sulphur Springs	96	64	81.4	4.78	
Temple *a*	96	60	80.2	0.90	
Temple *b*	96	60	80.0	0.91	
Trinity	100	60	82.2	3.71	
Tyler	99	67	83.1	2.35	
Victoria	96[f]	68[f]	82.1[f]	6.71	
Waco	101	67	84.6	0.40	
Waxahachie	103	63	83.2	0.33	
Weatherford	101	62	83.4	0.83	
Weimar	99	68	82.2	3.89	
Wharton	97	71	83.6	5.34	
Wichita Falls	.....	.....	.....	2.53	
Utah.					
Aneth	102	45	77.3	0.04	
Blackrock	92	40	69.1	1.75	
Bluecreek	103	55	82.0	0.00	
Callao	99	36	72.4	T.	
Castledale	100[o]	40[o]	69.8[o]	0.15	
Corinne	105	43	75.2	0.11	
Coyoto	88	28	62.2	0.30	
Deseret	98	33	71.2	0.08	
Farmington	94	41	71.2	0.20	
Fillmore	104	42	77.6	0.38	
Fort Duchesne	97	39	69.0	0.20	
Frisco	95	52	74.6	1.12	
Garrison	98	35	72.8	0.55	
Giles	101	39	74.8	0.12	
Government Creek	95	40	73.8	0.26	
Green River	108[1]	50[1]	78.9[1]	1.01	
Grover	94	42	68.5	0.33	
Heber	96	32	65.6	0.20	
Henefer	95	29	66.4	0.13	
Hite	107	62	84.8	T.	
Huntsville	.....	.....	.....	0.46	
Ibapah	96	30	67.0	0.20	
Kanab	95	52	73.7	1.34	
Kelton	97	54	75.8	0.00	
La Sal	89	41	68.8	0.31	
Levan	94	42	71.4	0.15	
Loa	100	33	68.0	0.40	
Logan	96	44	72.5	0.12	
Lund	98	45	72.2	2.70	
Manti	94	38	69.3	0.11	
Marysvale	92	36	67.0	1.19	
Millville	.....	.....	.....	0.10	
Moab	102	44	77.3	0.03	
Monticello	90	50	74.7	0.30	
Morgan	94	32	66.7	0.10	
Mount Nebo	98	43	74.2	0.11	
Mount Pleasant	96	40	72.6	T.	
Ogden	93	48	74.0	0.35	
Parowan	97	38	68.9	1.46	
Pinto	90	36	65.4	1.74	
Plateau	95	29	64.6	0.58	
Promontory[s1]	99	51	79.9	0.00	
Provo	97	39	71.2	0.42	
Ranch	90	36	65.3	0.45	
Richfield	94	32	68.3	0.30	
St. George	110	43	79.5	0.50	
Salt Air	92	47	72.5	T	
Scipio	95	32	71.2	0.17	
Snowville	97	35	66.8	0.02	
Terrace	100	44	73.3	T.	
Thistle	100	45	76.0	0.10	
Tooele	102	47	77.1	T.	
Tropic	90	45	67.6	0.20	
Vernal	96	38	70.6	0.13	
Wellington	98	36	69.2	0.33	
Woodruff	97	27	62.2	0.00	
Vermont.					
Burlington	84	50	64.2	4.02	
Cavendish	81	38	59.5	3.64	
Chelsea	78	43	58.7	3.28	
Derby	78	43	58.8	4.04	
Enosburg Falls	80	37	58.9	3.79	
Hartland	78	39	58.2	3.22	
Jacksonville	70	35	53.4	4.75	
Manchester	76	38	60.0	6.19	
Morrisville	83	35	59.8	3.09	
Norwich	79	38	58.7	3.61	
St. Johnsbury	83	38	60.4	2.90	
Wells	76	40	60.8	5.93	
Woodstock	79	35	60.6	4.03	
Virginia.					
Ashland	95	59	74.2	7.54	
Barboursville	93	56	72.9	5.70	
Bedford	98	56	76.8	4.06	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bigstone Gap	94	56	73.9	3.07	
Blacksburg	91	52	70.4	3.68	
Bonair	97	60	77.3	4.28	
Boykins	101	62	79.0	3.03	
Buckingham	98	54	74.0	6.47	
Burkes Garden	85	45	67.0	2.73	
Callaville	95	52	74.8	6.02	
Charlottesville	97	55	73.0	3.82	
Clarksville	.....	.....	.....	4.36	
Columbia	97	51	71.2	6.90	
Dale Enterprise	95	46	69.8	5.18	
Danville	.....	.....	.....	2.36	
Elk Knob	88	59	73.2	3.34	
Farmville	97	59	75.4	5.78	
Fredericksburg	98	52	73.6	4.36	
Hampton	96	63	77.2	5.89	
Hot Springs	88	47	68.8	3.80	
La Crosse	99	61	77.0	6.30	
Lincoln	99	49	71.2	7.06	
Manassas	95	53	72.2	4.92	
Marion	90[e]	53[e]	71.8[e]	4.10	
McDowell	94	40	69.2	1.35	
Mendota	.....	.....	.....	2.49	
Newport News	105	66	80.1	5.51	
Petersburg	99	62	75.5	4.85	
Quantico	99	54	73.2	.....	
Radford	.....	.....	.....	2.62	
Riverton	.....	.....	.....	0.51	
Roanoke	92	50	71.2	3.52	
Rockymount	89	58	71.4	4.12	
Saxe	101	46	69.2	3.68	
Shenandoah	.....	.....	.....	3.93	
Speers Ferry	.....	.....	.....	2.40	
Spottsville	97	59	75.8	7.30	
Stanardsville	90	50	69.7	2.91	
Staunton	95	51	72.4	5.53	
Stephens City	101	47	70.8	3.43	
Warsaw	95	60	74.8	4.52	
Wilkerson	96	60	74.0	9.39	
Williamsburg	96	62	75.1	4.87	
Woodstock	101	49	72.8	3.41	
Wytheville	94	52	73.0	3.99	
Washington.					
Aberdeen	84	47	60.5	0.84	
Anacortes	.....	.....	.....	1.03	
Ashford	.....	.....	.....	1.62	
Blaine	76	42	59.2	2.19	
Bremerton	84	41	60.8	0.65	
Brinnon	82	42	62.2	0.76	
Cedonia	91	41	63.6	1.57	
Centralia	90	40	62.8	0.91	
Cheney	.....	.....	.....	3.30	
Clearbrook	88	41	60.5	2.78	
Clearwater	81	45	60.4	2.04	
Cle Elum	95	35	61.4	0.24	
Colfax	101	37	64.2	1.09	
Colville	97	39	64.9	1.39	
Conconully	90	42	63.4	2.09	
Connell	.....	.....	.....	0.70	
Coupeville	81	46	60.6	0.86	
Crescent	98	39	65.3	1.03	
Danville	95	43	65.2	1.53	
Dayton	97	42	66.8	1.17	
East Sound	83	40	60.2	1.37	
Ellensburg	91	43	64.9	0.30	
Ephrata	107	48	74.4	0.60	
Grandmound	87	39	62.0	1.71	
Granite Falls	.....	.....	.....	0.63	
Hooper	106	44	70.7	1.20	
Horseheaven	.....	.....	.....	1.05	
Ilwaco	75	47	59.6	1.55	
Lacenter	90	45	62.6	1.31	
Lakeside	96	44	70.6	1.48	
Lind	104	44	71.2	1.07	
Loomis	95	47	69.4	1.48	
Mottinger Ranch	104	49	74.2	0.35	
Mount Pleasant	87	47	63.2	1.12	
Moxee	100	41	68.2	0.62	
Northport	95	36	63.6	0.84	
Odessa	103	42	73.8	1.00	
Olga	77	50	60.0	1.20	
Olympia	90	44	63.2	1.18	
Pinehill	95	44	68.0	0.21	
Pomeroy	106	43	69.6	1.32	
Port Townsend	78	47	60.0	0.84	
Republic	95	36	62.6	1.15	
Ritzville	.....	.....	.....	0.32	
Ritzville (near)	.....	.....	.....	0.80	
Rosalia	97	38	64.0	1.04	
Sedro-Woolley	85	44	62.1	1.83	
Silvana	83	46	62.1	0.02	
Snohomish	85	44	61.7	0.30	
Snoqualmie	87	47	64.1	1.91	
Southbend	88	44	61.0	1.30	
South Ellensburg	98	46	66.6	0.50	
Sprague	.....	.....	.....	0.96	
Sunnyside	95	44	67.8	0.68	
Trinidad	105	55	76.2	0.30	
Twisp	98	43	67.4	1.62	
Union	86	42	62.6	0.65	
Usk	93[e]	35[e]	62.5[f]	0.85	
Vancouver	92	46	65.8	0.56	
Vashon	85	50	62.2	0.79	
Waterville	97	40	65.4	1.04	
Wenatchee (near)	94	46	67.3	0.74	
Whatcom	78	43	60.0	1.29	
Wilbur	95	33	63.4	1.17	
Zindel	109	49	77.6	1.40	
West Virginia.					
Bayard	90	38	66.2	2.84	
Beverly	90	45	68.5	3.78	
Bluefield	91	54	73.3	2.00	
Burlington	96	46	70.8	3.92	
Charleston	104	50	77.3	1.93	
Creston	97	48	73.7	1.08	
Cuba	96	47	72.5	1.97	
Elkhorn	92	52	71.8	1.90	
Fairmont	.....	.....	.....	1.74	
Glenville	97	48	72.6	2.25	
Grafton	96	46	71.2	2.28	
Green Sulphur Springs	105	48	71.6	2.26	
Harpers Ferry	.....	.....	.....	4.82	
Hinton	93[e]	53[e]	73.5[e]	3.42	
Huntington	98	52	75.0	2.62	
Josiah	95	50	72.9	3.48	
Leonard	89	49	69.4	4.42	
Lewisburg	91	50	70.6	4.39	
Lillydale	93	49	72.0	2.34	
Logan	93	52	73.9	2.38	
Lost Creek	94	44	69.2	2.14	
Mannington	97	44	71.8	1.73	
Marlinton	87	46	68.6	3.30	
Martinsburg	99	49	69.8	4.05	
Morgantown	92	48	71.4	1.34	
Moscow	91	44	69.2	5.02	
Moundsville	94	48	72.6	1.58	
New Martinsville	97	49	75.0	1.26	
Nuttallburg	94	50	72.6	1.70	
Oldfields	100	44	72.1	2.84	
Parsons	91	43	68.4	3.25	
Philippi	94	43	70.2	2.40	
Pickens	88	45	68.1	5.85	
Point Pleasant	98	50	75.9	0.99	
Powellton	99	42	71.0	1.91	
Princeton	88	53	70.4	3.75	
Romney	93	46	70.4	4.01	
Rowlesburg	.....	.....	.....	3.65	
Ryan	97	46	73.0	1.72	
Southside	98	54	75.8	1.02	
Terra Alta	88	40	65.6	3.00	
Travellers Repose	88	39	66.6	3.54	
Uneeda	102	50	75.6	1.28	
Uppertract	93	44	70.5	4.82	
Valley Fork	95	50	73.2	4.05	
Webster Springs	92	47	71.5	.....	
Wellsburg	89	48	70.0	2.03	
Weston	.....	.....	.....	2.84	
Wheeling[a]	.....	.....	.....	1.95	
Wheeling[b]	102	56	78.2	1.54	
Williamson	97	52	75.0	2.03	
Wisconsin.					
Amherst	83	41	62.4	6.88	
Antigo	84	30	61.5	7.48	
Appleton Marsh	83	48	63.0	7.09	
Ashland	.....	.....	.....	5.39	
Barron	86	36	62.6	4.75	
Brodhead	90	46	68.0	5.75	
Butternut	85	33	60.5	4.56	
Chilton	83	41	64.0	7.30	
Chippewa Falls	.....	.....	.....	1.24	
Citypoint	85	45	64.4	6.09	
Darlington	89	42	67.2	8.09	
Dodgeville	.....	.....	.....	8.00	
Downing	85	36	61.3	5.01	
Easton	82	41	63.9	9.01	
Eau Claire	85	45	63.6	5.09	
Florence	85	40	60.6	5.14	
Fond du Lac	82	41	65.2	8.43	
Grand Rapids	94	44	64.6	5.37	
Grand River Locks	.....	.....	.....	10.79	
Grantsburg	90	36	61.9	5.79	
Hancock	82	44	63.3	7.87	
Harvey	85	47	65.6	7.69	
Hayward	86	34	60.7	5.06	
Hillsboro	86	40	64.8	10.16	
Koepenick	85	34	60.2	6.30	
Lancaster	88	45	66.4	6.28	
Madison	83	53	66.2	6.95	
Manitowoc	83	45	63.8	4.24	
Meadow Valley	84	43	63.7	7.40	
Medford	90	36	64.1	7.30	
Menasha	.....	.....	.....	5.00	
Neillsville	89	40	63.3	6.92	
New London	86	42	63.2	4.66	
North Crandon	82	33	56.8	5.56	
Oconto	85	42	63.6	4.86	
Osceola	90	38	62.8	4.42	
Pine River	83	41	63.4	6.03	
Portage	82	47	65.5	9.75	
Port Washington	84	47	64.8	6.37	
Prairie du Chien[a]	90	48	68.9	8.22	
Prairie du Chien[b]	.....	.....	.....	8.22	
Prentice	82	32	59.6	4.47	
Racine	87	51	68.4	4.76	
Sheboygan	87	47	66.0	5.82	
Stevens Point	83	41	62.8	6.46	
Tomahawk	85	32	60.0	6.20	
Valley Junction	85	38	64.4	6.28	
Viroqua	86	44	64.3	9.62	
Watertown	84	43	64.4	6.09	
Waukesha	82	50	65.0	7.39	
Waupaca	82	43	63.4	6.32	
Wausau	85	38	62.4	6.02	
Whitehall	83	40	64.5	6.53	
Wyoming.					
Afton	90	31	62.0	0.57	
Alcova	95	40	69.6	0.62	
Basin	98	43	73.3	T.	
Bedford	88	29	59.8	0.81	
Border	92	26	60.4	0.25	
Buffalo	91	40	65.5	2.50	
Chugwater	91	40	65.5	2.47	
Daniel	87	27	55.2	0.61	
Evanston	90	28	61.7	0.05	
Fort Laramie	101	45	71.3	2.73	
Fort Washakie	92	38	67.4	0.44	
Fort Yellowstone	90	36	61.2	0.45	
Fourbear	85	30	60.0	0.25	
Griggs	96	38	67.3	0.58	
Hyattville	105	40	71.0	.....	
Iron Mountain	98	33	65.4	1.66	
Laramie	84	38	63.4	0.88	
Leo	86	33	62.6	0.52	
Lolabama Ranch	88	30	56.6	0.23	
Lusk	95	35	66.6	0.57	
Marquette	91	37	65.8	0.38	
Moorcroft	95	45	68.9	4.11	
Moore	90	33	65.7	1.51	
Parkman	94[e]	42[e]	66.4[e]	1.74	
Pinebluff	98	40	68.5	1.91	
Phillips	98	35	67.8	0.99	
Rawlins	99	32	66.6	1.01	
Redbank	94	39	69.0	0.30	
South Pass	102	20	60.2	T.	
Tensleep	94	39	69.3	T.	
Thayne	91	26	58.8	0.42	
Thermopolis	106	47	76.2	1.54	
Porto Rico.					
Adjuntas	91	56	75.3	10.25	
Aguirre	94	69	81.3	7.14	
Arecibo	91	72	79.0	4.87	
Barros	87	61	75.2	8.15	
Caguas	94	61	80.0	12.90	
Canovanas	95	72	81.1	11.33	
Cayey	96	58	76.1	13.02	
Cidra	89	53	72.6	19.16	
Coamo	97	65	79.4	4.20	
Fajardo	93	69	82.8	9.44	
Guanica	98	60	76.6	6.44	
Hacienda Coloso	93	67	80.2	6.30	
Hacienda Josefa	.....	.....	.....	6.59	
Hacienda Perla	95	72	82.2	11.21	
Humacao	91	75	83.6	9.23	
Isabela	90	70	79.8	3.79	
Juana Diaz	93	68	80.1	9.33	
La Carmelita	91	64	76.6	11.63	
La Isolina	92	66	78.2	10.94	
Lares	92[d]	62[d]	77.5[d]	10.86	
Las Marias	93	67	79.4	9.02	
Manati	96	68	81.0	5.87	
Maunabo	96	69	82.2	10.34	
Mayaguez	97	58	79.6	7.89	
Morovis	95	66	79.5	19.40	
Rio Piedras	.....	.....	.....	7.50	
San German	100	66	82.6	7.17	
San Lorenzo	92	63	78.3	9.03	
San Salvador	88	63	76.2	10.74	
Santa Isabel	96	69	80.6	6.46	
Utuado	95	63	79.4	9.15	
Vieques	92	68	80.4	8.05	
Yauco	94	65	80.0	4.22	
Mexico.					
Ciudad P. Diaz	98	60	77.8	0.12	
Coatzacoalcos	92	68	80.0	11.14	
Leon de Aldamas	85	54	67.8	7.63	
Vera Cruz	90	68	79.2	17.00	
New Brunswick.					
St. John	70	48	59.2	1.36	
Isthmus of Panama.					
Alhajuela	97	75	81.6	15.75	
Bohio	.....	.....	.....	11.06	
Colon	.....	.....	.....	14.25	
Gamboa	.....	.....	.....	12.87	
La Boca	85	72	77.8	14.68	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
West Indies.	°	°	°	*Ins.*	*Ins.*
Columbia, Isle of Pines	93	68	80.8	13.90	
Late reports for July, 1903.					
Alaska.					
Coal Harbor	61	40	50.2	3.66	
Copper Center	87	29	58.4	0.99	
Fort Egbert	82	38	65.4	2.40	
Fort Gibbon	84	33	57.7	1.76	
Fort Liscum	70	37	51.2	4.29	
Juneau	76[4]	44[4]	57.0[6]	2.26	
Kenai	74	36	51.9	2.48	
Killisnoo	70	42	55.3	1.15	
Kotzebue	74	40	58.2	3.48	
Tyoonok	75	39	55.3	2.62	
Wood Island *	76	43	55.8	4.38	
Arizona.					
Buckeye	108	54	85.2	0.20	
Champie Camp	113	46	79.5	.....	
California.					
Newcastle	104	45	73.3	0.00	
Pilot Creek	.....	.....	.....	0.00	
Ventura	77	51	63.8	0.00	
Colorado.					
Cedaredge	101	43	70.3	.....	
Fort Collins	95	36	68.4	1.06	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Louisiana.	°	°	°	*Ins.*	*Ins.*
Minden	101	59	81.6	4.18	
Maine.					
Belfast	88	44	65.0	4.12	
Mississippi.					
Thornton	96	66	82.6	1.44	
Montana.					
Kipp	90	36	58.6	2.45	
Springbrook	102	42	65.8	2.91	
Nebraska.					
Franklin	100	45	74.2	3.59	
New Hampshire.					
Bethlehem	87	41	64.8	4.26	
New Mexico.					
Cloudcroft	78	42	58.6	0.66	
Los Lunas	99	52	76.2	0.50	
North Carolina.					
Brewers	96	47	75.1	2.59	
Highlands	84	39	65.3	3.45	
Patterson *[1]	92	48	69.9	4.35	
Salem	95	55	78.2	2.79	
Pennsylvania.					
York	95	50	74.6	4.26	
South Carolina.					
Temperance	97	63	80.9	5.18	
Texas.					
Temple *a*	97	60	79.8	6.48	

EXPLANATION OF SIGNS.

*Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance "9" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

July, 1903, Iowa, Ida Grove, make precipitation 4.31 instead of 6.41; New York, Skaneateles, make precipitation 4.50 instead of 4.55.

NOTE.—The following changes have been made in names of stations; West Virginia, Addison changed to Webster Springs; Dayton to Lost Creek; Oregon, Bend changed to Deschutes; Texas, Jackson moved to Dialville, 9 miles distant.

TABLE III.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of August, 1903.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	17	21	12	28	s. 76 w.	16
Portland, Me	19	23	12	20	s. 63 w.	9
Concord, N. H. †	14	9	9	5	n. 39 e.	6
Northfield, Vt	19	36	9	9	n.	17
Boston, Mass	20	15	16	23	n. 54 w.	9
Nantucket, Mass	15	26	17	17	s.	11
Block Island, R. I	18	19	17	22	s. 79 w.	5
Narragansett, R. I.*	6	12	8	10	s. 18 w.	6
New Haven, Conn	30	13	14	18	n. 13 w.	18
Middle Atlantic States.						
Albany, N. Y	23	22	16	13	n. 72 e.	3
Binghamton, N. Y.†	8	7	15	7	n. 83 e.	8
New York, N. Y	21	20	20	16	n. 76 e.	4
Harrisburg, Pa	15	18	30	12	s. 81 e.	18
Philadelphia, Pa	20	23	21	15	s. 63 e.	7
Scranton, Pa	17	20	22	17	s. 59 e.	6
Atlantic City, N. J	19	21	24	10	s. 82 e.	14
Cape May, N. J	17	19	29	10	s. 84 e.	19
Baltimore, Md	22	16	26	15	n. 61 e.	12
Washington, D. C	23	20	26	11	n. 79 e.	15
Cape Henry, Va.†	8	8	13	10	e.	3
Lynchburg, Va	21	12	27	20	n. 38 e.	11
Norfolk, Va	17	24	29	9	s. 71 e.	21
Richmond, Va	25	18	17	15	n. 16 e.	7
Wytheville, Va	12	15	16	35	s. 81 w.	19
South Atlantic States.						
Asheville, N. C	23	18	16	21	n. 45 w.	7
Charlotte, N. C	17	25	21	19	s. 14 e.	8
Hatteras, N. C	12	21	17	25	s. 42 w.	12
Kittyhawk, N. C.*	7	13	12	11	s. 9 e.	6
Raleigh, N. C	19	20	21	16	s. 79 e.	5
Wilmington, N. C	14	22	13	28	s. 62 w.	17
Charleston, S. C	15	29	13	20	s. 27 w.	16
Columbia, S. C	5	24	23	22	s. 3 e.	19
Augusta, Ga	11	31	16	18	s. 6 w.	20
Savannah, Ga	12	24	9	29	s. 59 w.	23
Jacksonville, Fla	2	34	17	24	s. 12 w.	33
Florida Peninsula.						
Jupiter, Fla	4	30	29	12	s. 33 e.	31
Key West, Fla	6	26	42	3	s. 63 e.	44
Sand Key, Fla. †	2	15	18	0	s. 54 e.	22
Tampa, Fla	14	18	20	20	s.	4
Eastern Gulf States.						
Atlanta, Ga	20	14	16	24	n. 53 w.	10
Macon, Ga.†	9	9	5	15	w.	10
Pensacola, Fla.†	17	4	7	12	n. 21 w.	14
Mobile, Ala	24	14	8	27	n. 62 w.	22
Montgomery, Ala	10	18	16	30	s. 60 w.	16
Meridian, Miss.†	5	7	5	17	s. 81 w.	12
Vicksburg, Miss	12	27	18	21	s. 11 w.	15
New Orleans, La	14	23	14	21	s. 38 w.	11
Western Gulf States.						
Shreveport, La	12	31	24	9	s. 38 e.	24
Fort Smith, Ark	13	16	37	7	s. 84 e.	30
Little Rock, Ark	19	27	11	18	s. 41 w.	11
Corpus Christi, Tex	7	39	29	5	s. 37 e.	40
Fort Worth, Tex	6	42	22	9	s. 20 e.	38
Galveston, Tex	6	39	19	7	s. 19 e.	36
Palestine, Tex	8	42	12	15	s. 5 w.	34
San Antonio, Tex	5	33	42	1	s. 56 e.	50
Taylor, Tex. †	4	24	4	0	s. 11 e.	20
Ohio Valley and Tennessee.						
Chattanooga, Tenn	16	15	12	33	n. 87 w.	21
Knoxville, Tenn	21	18	9	29	n. 81 w.	20
Memphis, Tenn	17	26	11	30	s. 45 w.	13
Nashville, Tenn	19	22	13	24	s. 75 w.	11
Lexington, Ky. †	8	12	10	10	s.	4
Louisville, Ky	21	26	9	17	s. 58 w.	9
Evansville, Ind.†	10	12	9	4	s. 68 e.	5
Indianapolis, Ind	21	20	12	19	n. 82 w.	7
Cincinnati, Ohio	21	19	14	22	n. 76 w.	8
Columbus, Ohio	19	20	16	22	s. 80 w.	6
Pittsburg, Pa	25	17	10	21	n. 54 w.	14
Parkersburg, W. Va	19	21	15	21	s. 72 w.	6
Elkins, W. Va	19	11	10	31	n. 69 w.	22
Lower Lake Region.						
Buffalo, N. Y	16	16	23	19	e.	4
Oswego, N. Y	11	30	16	19	s. 9 w.	19
Rochester, N. Y	11	20	20	27	s. 38 w.	11
Syracuse, N. Y	11	24	15	19	n. 17 w.	14
Erie, Pa	21	18	15	19	n. 53 w.	5
Cleveland, Ohio	21	20	21	16	n. 79 e.	5
Sandusky, Ohio †	5	8	9	12	s. 45 w.	4
Toledo, Ohio	19	14	18	22	n. 39 w.	6
Detroit, Mich	21	10	21	24	n. 15 w.	11
Upper Lake Region.						
Alpena, Mich	22	13	24	20	n. 24 e.	10
Escanaba, Mich	27	14	17	16	n. 4 e.	13
Grand Rapids, Mich	20	16	18	20	n. 27 w.	4
Houghton, Mich.†	6	4	11	14	n. 56 w.	4
Marquette, Mich	23	11	18	25	n. 30 w.	14
Port Huron, Mich	21	16	21	19	n. 22 e.	5
Sault Ste. Marie, Mich	16	11	21	26	n. 45 w.	7
Chicago, Ill	17	19	25	17	s. 76 e.	8
Milwaukee, Wis	24	15	22	18	n. 24 e.	10
Green Bay, Wis	22	16	23	16	n. 49 e.	9
Duluth, Minn	34	7	27	16	n. 22 e.	29
North Dakota.						
Moorhead, Minn	21	16	27	12	n. 72 e.	16
Bismarck, N. Dak	21	17	26	10	n. 76 e.	16
Williston, N. Dak	22	12	25	14	n. 48 e.	15
Upper Mississippi Valley.						
Minneapolis, Minn.*	13	9	11	8	n. 37 e.	5
St. Paul, Minn	22	16	21	17	n. 34 e.	7
La Crosse, Wis. †	10	12	11	4	s. 74 e.	7
Davenport, Iowa	15	23	16	20	s. 27 w.	9
Des Moines, Iowa	15	20	15	24	s. 61 w.	10
Dubuque, Iowa	20	24	17	17	s.	4
Keokuk, Iowa	20	21	13	21	s. 83 w.	8
Cairo, Ill	21	23	11	19	s. 76 w.	8
Springfield, Ill	19	22	13	21	s. 69 w.	8
Hannibal, Mo. †	7	12	4	16	s. 67 w.	13
St. Louis, Mo	20	24	17	16	s. 14 e.	4
Missouri Valley.						
Columbia, Mo. *	9	14	5	11	s. 50 w.	8
Kansas City, Mo	20	26	20	12	s. 53 e.	10
Springfield, Mo	20	27	21	6	s. 65 e.	17
Topeka, Kans.*	10	15	11	2	s. 61 e.	10
Lincoln, Nebr	18	27	17	8	s. 45 e.	13
Omaha, Nebr	18	28	17	8	s. 42 e.	14
Valentine, Nebr	19	19	23	13	e.	10
Sioux City, Iowa †	11	12	13	3	s. 84 e.	10
Pierre, S. Dak	17	19	33	6	s. 86 e.	27
Huron, S. Dak	21	21	27	8	e.	19
Yankton, S. Dak. †	9	7	14	7	n. 74 e.	7
Northern Slope.						
Havre, Mont	15	12	25	23	n. 34 e.	4
Miles City, Mont	17	6	29	22	n. 32 e.	13
Helena, Mont	20	21	9	27	s. 87 w.	18
Kalispell, Mont	9	9	12	39	w.	27
Rapid City, S. Dak	19	15	19	23	n. 45 w.	6
Cheyenne, Wyo	16	21	12	29	s. 74 w.	18
Lander, Wyo	15	24	8	30	s. 68 w.	24
North Platte, Nebr	11	30	29	10	s. 45 e.	27
Middle Slope.						
Denver, Colo	12	31	14	16	s. 6 w.	19
Pueblo, Colo	23	14	18	23	n. 29 w.	10
Concordia, Kans	12	28	20	6	s. 41 e.	21
Dodge, Kans	9	34	28	4	s. 44 e.	35
Wichita, Kans	15	28	30	1	s. 66 e.	32
Oklahoma, Okla	10	38	24	3	s. 37 e.	35
Southern Slope.						
Abilene, Tex	11	35	27	5	s. 42 e.	32
Amarillo, Tex	6	44	16	10	s. 9 e.	38
Southern Plateau.						
El Paso, Tex	15	13	32	14	n. 84 e.	18
Santa Fe, N. Mex	16	21	27	12	s. 72 e.	16
Flagstaff, Ariz	19	19	5	33	w.	28
Phoenix, Ariz	11	7	27	24	n. 37 e.	5
Yuma, Ariz	7	28	13	26	s. 31 w.	25
Independence, Cal	15	23	13	28	s. 62 w.	17
Middle Plateau.						
Carson City, Nev	5	14	4	49	s. 79 w.	46
Winnemucca, Nev	17	17	12	35	w.	28
Modena, Utah	6	23	5	42	s. 66 w.	41
Salt Lake City, Utah	20	24	28	12	s. 76 e.	16
Grand Junction, Colo	16	13	27	20	n. 67 e.	8
Northern Plateau.						
Baker City, Oreg	20	32	9	18	s. 37 w.	15
Boise, Idaho	22	11	10	36	n. 67 w.	28
Lewiston, Idaho †	2	4	25	2	s. 85 e.	23
Pocatello, Idaho	4	15	27	23	s. 20 e.	12
Spokane, Wash	15	24	16	19	s. 18 w.	10
Walla Walla, Wash	4	39	13	16	s. 5 w.	35
North Pacific Coast Region.						
North Head, Wash	37	10	5	28	n. 40 w.	36
Port Crescent, Wash. *	0	5	2	28	s. 79 w.	26
Seattle, Wash	14	20	14	27	s. 65 w.	14
Tacoma, Wash	29	12	2	28	n. 57 w.	31
Tatoosh Island, Wash	4	35	10	27	s. 29 w.	35
Portland, Oreg	30	18	5	30	n. 64 w.	28
Roseburg, Oreg	40	3	19	13	n. 9 e.	38
Middle Pacific Coast Region.						
Eureka, Cal	25	14	3	33	n. 70 w.	33
Mount Tamalpais, Cal	28	6	0	46	n. 64 w.	51
Red Bluff, Cal	18	31	24	7	s. 52 e.	22
Sacramento, Cal	7	47	20	2	s. 24 e.	44
San Francisco, Cal	0	16	0	56	s. 74 w.	58
Point Reyes Light, Cal. *	21	2	0	21	n. 48 w.	28
Southeast Farallon, Cal	39	5	0	43	n. 52 w.	55
South Pacific Coast Region.						
Fresno, Cal	36	0	0	47	n. 53 w.	59
Los Angeles, Cal	4	21	7	40	s. 62 w.	37
San Diego, Cal	24	15	0	40	n. 77 w.	41
San Luis Obispo, Cal	5	22	0	35	s. 64 w.	39
West Indies.						
Basseterre, St. Kitts, W. I	14	5	54	0	n. 81 e.	55
Bridgetown, Barbados	12	11	50	2	n. 89 e.	48
Cienfuegos, Cuba	10	7	50	1	n. 86 e.	49
Colon, Colombia, S. A. †	2	25	5	3	s. 5 e.	23
Grand Turk, W. I. †	1	4	29	1	s. 84 e.	28
Hamilton, Bermuda	14	25	5	29	s. 65 w.	26
Havana, Cuba †	1	1	30	0	e.	30
Port of Spain, Trinidad †	1	17	24	0	s. 56 e.	29
Puerto Principe, Cuba	19	9	45	4	n. 76 e.	42
Roseau, Dominica, W. I. †	14	5	15	5	n. 48 e.	14
San Juan, Porto Rico	3	14	51	3	s. 77 e.	49

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Thunderstorms and auroras, August, 1903.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	52	T.	6	5	5	5	7	7	6	3	8	6	2	2	1	7	6	8	6	5	3	2	1	1	1	3	1	1	....	2	9	6	....	125	29	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arizona	56	T.	....	....	....	4	10	10	11	17	13	4	9	5	6	3	5	8	2	4	4	3	2	4	1	4	3	3	1	4	7	4	5	156	28	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arkansas	57	T.	3	5	8	9	6	10	....	7	15	10	13	11	9	4	4	4	7	3	2	....	....	....	....	1	3	....	3	10	6	....	....	153	23	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
California	167	T.	....	....	....	....	1	....	3	....	4	3	....	....	....	1	....	2	4	4	2	5	2	1	....	1	....	....	....	....	....	....	....	33	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Colorado	81	T.	1	5	....	1	3	10	5	8	11	7	7	8	7	8	10	9	8	6	5	10	13	11	17	12	16	11	4	1	1	....	....	215	28	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Connecticut	21	T.	....	....	....	....	2	10	4	....	....	....	2	1	....	....	....	....	....	1	3	....	....	7	2	....	16	1	....	....	....	....	....	....	49	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	2	....	....	....	....	....	....	....	....	....	7	2	A.
Delaware	5	T.	....	....	..	1	....	....	....	2	1	....	3	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	9	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Dist. of Columbia	4	T.	....	....	....	....	....	....	1	....	....	2	1	....	....	....	....	....	....	....	2	....	....	....	....	....	1	2	....	2	2	2	....	15	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Florida	47	T.	11	7	8	8	14	15	14	9	12	12	11	10	9	11	8	11	10	11	8	5	10	9	10	10	12	11	7	11	17	12	10	323	31	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Georgia	55	T.	17	13	13	13	16	7	8	....	15	6	9	14	17	13	12	10	8	11	4	4	2	1	1	2	....	5	1	6	9	15	5	257	30	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Idaho	34	T.	1	1	....	1	....	2	....	1	1	....	....	....	....	2	....	1	....	....	1	3	4	4	1	....	....	1	....	....	1	....	....	25	15	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	1	A.
Illinois	92	T.	3	10	22	25	39	....	....	5	2	3	2	5	10	4	24	3	....	....	12	....	....	....	....	10	13	20	25	26	3	....	....	266	21	T.
		A.	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	4	3	A.
Indiana	58	T.	3	15	16	24	26	3	....	1	1	10	1	....	4	4	6	....	....	....	3	2	....	....	....	2	17	20	17	5	12	....	....	192	21	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	2	2	A.
Indian Territory	11	T.	....	....	....	....	....	....	2	1	1	....	2	1	2	1	....	....	2	....	....	....	....	....	....	....	....	....	1	4	2	1	....	20	12	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	1	1	A.
Iowa	149	T.	27	2	39	9	32	1	9	13	19	10	2	13	3	21	6	....	....	6	7	....	1	3	6	22	24	40	32	24	3	....	....	374	26	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	4	1	A.
Kansas	77	T.	7	4	1	....	2	5	6	5	5	6	5	6	7	4	7	5	2	4	....	....	....	....	....	6	3	5	3	4	1	1	....	104	25	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	1	....	....	....	3	3	A.
Kentucky	41	T.	1	6	7	6	13	3	....	....	....	....	3	2	3	3	2	....	....	....	7	....	....	1	1	....	1	9	3	7	14	....	....	92	19	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Louisiana	46	T.	12	12	8	9	9	6	5	8	7	9	7	10	7	3	7	9	6	4	4	8	7	5	5	10	14	4	4	5	5	7	....	216	30	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maine	19	T.	....	....	....	....	....	....	3	....	....	....	1	....	1	....	....	1	10	....	3	....	....	3	2	....	....	....	....	....	....	....	....	24	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	8	....	....	....	....	....	....	....	....	....	....	9	2	A.
Maryland	48	T.	....	....	2	4	2	11	3	2	7	8	5	....	2	1	1	5	....	....	5	1	....	....	....	4	14	5	4	17	2	1	....	106	22	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	4	1	A.
Massachusetts	48	T.	....	....	....	....	1	5	....	....	2	....	2	....	....	....	....	4	5	....	....	1	....	....	....	....	4	1	....	....	....	....	....	25	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	12	....	....	....	....	1	....	....	....	....	....	13	2	A.
Michigan	106	T.	....	....	25	6	29	4	....	7	1	5	2	....	....	....	....	1	....	7	14	19	....	9	3	13	21	13	1	2	1	6	1	190	22	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	5	1	A.
Minnesota	67	T.	....	12	15	16	11	....	1	3	13	3	....	....	....	17	3	4	6	2	....	4	9	1	2	7	3	4	1	7	....	....	....	144	22	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....	....	....	....	....	....	....	....	3	2	A.
Mississippi	44	T.	8	6	10	6	7	12	6	11	13	15	10	8	3	8	7	6	1	10	10	5	1	....	3	6	6	2	....	3	7	7	....	197	28	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Missouri	95	T.	28	32	8	7	40	22	30	38	17	15	18	34	33	10	29	/	....	....	12	....	....	....	3	13	42	26	38	27	2	....	....	525	24	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	2	A.
Montana	40	T.	7	7	12	5	....	5	4	....	2	4	3	1	5	5	7	3	1	2	3	1	4	6	10	3	2	9	2	1	....	....	....	115	26	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	5	3	....	....	....	....	....	....	....	....	....	....	9	3	A.
Nebraska	142	T.	22	21	16	1	15	1	25	5	25	9	21	35	12	29	7	6	4	17	4	1	1	7	6	20	24	40	28	1	1	....	....	404	29	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Nevada	40	T.	....	....	....	....	....	....	1	....	....	2	2	2	....	....	....	1	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	12	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Hampshire	19	T.	....	....	....	....	....	....	....	....	1	....	6	1	....	1	1	1	5	....	2	4	....	1	1	....	....	....	....	....	....	....	....	24	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	11	....	....	....	....	....	....	....	....	....	....	11	1	A.
New Jersey	51	T.	....	1	....	3	1	19	4	3	5	1	12	....	....	....	....	....	....	....	14	2	1	1	2	3	24	8	2	....	....	....	....	106	18	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	3	1	A.
New Mexico	31	T.	1	5	4	....	1	2	2	4	2	2	4	2	1	6	3	....	2	3	4	1	1	1	2	....	2	1	....	1	4	2	1	64	27	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New York	99	T.	1	....	1	1	5	39	4	1	40	2	43	4	....	2	....	2	3	....	41	17	....	12	5	4	53	....	....	2	1	....	7	290	24	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	2	....	....	....	....	....	....	....	....	....	5	2	A.
North Carolina	56	T.	16	8	4	13	11	20	3	15	6	22	19	7	16	16	13	7	12	9	3	2	....	....	....	....	....	9	10	3	19	21	16	309	26	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	0	0	A.
North Dakota	48	T.	1	1	1	8	....	1	6	5	1	....	....	2	5	2	3	2	5	1	1	2	....	5	12	8	1	1	1	....	....	....	1	76	24	T.
		A.	....	....	....	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	6	....	....	1	....	....	....	....	....	....	....	....	10	5	A.
Ohio	128	T.	....	3	5	13	18	13	1	1	2	1	2	....	....	....	2	2	....	1	29	4	1	....	5	10	42	19	23	10	38	1	....	246	24	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....	5	1	A.
Oklahoma	23	T.	1	....	....	....	....	5	....	3	8	1	5	1	5	2	....	1	3	1	....	....	....	....	....	....	....	....	5	6	3	3	....	53	16	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Oregon	74	T.	....	....	....	....	4	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	2	10	1	1	2	....	....	....	....	....	....	21	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Pennsylvania	91	T.	....	....	2	3	2	32	7	....	11	1	15	....	....	....	1	8	1	....	14	5	....	2	6	13	33	12	5	12	8	3	....	196	22	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	1	....	....	....	....	....	....	....	....	....	....	6	2	A.
Rhode Island	7	T.	....	....	....	....	....	1	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	3	....	....	....	....	....	....	....	7	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	2	1	A.
South Carolina	46	T.	17	13	11	14	8	5	7	5	7	7	12	12	17	16	10	10	4	5	5	5	2	....	....	....	1	....	....	2	4	15	13	227	26	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Dakota	56	T.	6	11	5	2	3	....	16	4	15	1	....	9	3	11	1	1	1	17	3	1	8	5	10	8	5	7	5	1	....	....	....	159	26	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	2	1	A.
Tennessee	56	T.	3	12	11	14	11	7	....	....	1	12	11	5	1	15	7	5	8	14	12	2	....	....	....	2	1	6	3	11	12	....	....	186	24	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Texas	95	T.	2	12	11	4	5	4	3	2	13	13	13	6	1	4	6	4	12	20	9	1	3	5	5	5	4	....	2	3	8	11	13	204	30	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Utah	47	T.	....	....	....	....	....	1	1	2	5	12	8	9	6	12	3	1	2	2	10	17	11	5	1	1	1	1	....	....	2	....	....	113	22	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Vermont	16	T.	....	....	....	....	....	1	....	....	2	....	9	....	....	....	....	2	3	1	6	4	1	1	....	....	....	....	....	....	....	....	....	....	30	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	1	A.
Virginia	50	T.	3	4	1	10	3	8	....	2	6	5	6	2	1	....	....	7	3	1	5	2	....	....	....	....	3	13	8	4	10	13	6	126	24	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Washington	64	T.	1	1	....	....	3	3	....	....	....	....	....	....	....	2	....	....	....	2	7	....	....	8	4	2	....	....	....	1	....	....	....	34	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
West Virginia	43	T.	2	1	....	2	....	5	2	....	1	1	2	....	....	....	1	6	2	1	11	3	....	....	....	1	6	5	4	10	10	5	....	81	21	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Wisconsin	60	T.	4	6	20	13	27	1	20	3	....	....	....	....	....	9	8	2	2	8	2	....	3	5	16	17	11	3	....	6	3	....	....	189	22	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	....	....	....	....	....	....	....	....	....	....	6	1	A.
Wyoming	31	T.	....	3	....	....	1	....	2	6	4	5	4	2	4	2	....	3	2	3	1	3	7	7	8	3	3	1	2	....	....	....	....	76	22	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Sums	2893	T.	215	244	291	260	388	316	224	203	326	233	315	230	204	260	211	164	160	194	306	130	107	135	163	235	427	307	246	240	232	131	77	7174	....	T.
		A.	1	....	....	1	....	....	1	....	....	....	....	1	1	1	....	2	....	....	....	2	96	9	1	2	....	....	2	1	....	....	....	121	....	A.

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during August, 1903, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	25			0.96														0.38			
Alpena, Mich.	3–4			1.39														0.42			
Amarillo, Tex.	10–11	11:45 p. m.	2:30 a. m.	1.76	12:30 a. m.	1:14 a. m.	0.15	0.05	0.15	0.29	0.57	0.78	0.97	1.15	1.36	1.53					
Asheville, N. C.	29	1:05 p. m.	1:25 p. m.	0.51	1:05 p. m.	1:20 p. m.	0.00	0.23	0.37	0.51											
Atlanta, Ga.	15	7:23 p. m.	8:15 p. m.	0.41	7:23 p. m.	7:36 p. m.	0.00	0.18	0.31	0.39	0.40										
Atlantic City, N. J.	4–5	9:00 p. m.	2:00 a. m.	1.44	12:17 a. m.	1:20 a. m.	0.04	0.06	0.24	0.31	0.35	0.37	0.38	0.40	0.44	0.62	1.00	1.29			
Augusta, Ga.	2	8:14 p. m.	10:09 p. m.	1.98	8:22 p. m.	9:10 p. m.	T.	0.10	0.31	0.53	0.74	1.00	1.34	1.58	1.70	1.85	1.88				
Do	4	7:03 p. m.	8:25 p. m.	1.31	7:03 p. m.	7:30 p. m.	0.00	0.17	0.53	0.77	0.98	1.14	1.19	1.23	1.25						
Do	14	8:45 p. m.	9:50 p. m.	3.08	8:46 p. m.	9:25 p. m.	T.	0.19	0.59	1.33	1.77	2.20	2.56	2.87	3.01						
Baltimore, Md.																					
Binghamton, N. Y.	11	3:17 p. m.	3:53 p. m.	0.53	3:21 p. m.	3:35 p. m.	0.01	0.23	0.46	0.52											
Bismarck, N. Dak.	23–24	11:14 p. m.	2:40 a. m.	2.30	11:25 p. m.	12:25 a. m.	0.07	0.07	0.18	0.30	0.40	0.48	0.55	0.77	0.90	1.04	1.07	1.25			
Block Island, R. I.	4–5			1.50														0.30			
Boise, Idaho.	26			0.11														0.07			
Boston, Mass.	4–6			1.28														0.24			
Buffalo, N. Y.	4			2.34														0.62			
Cairo, Ill.	14			0.39														0.34			
Charleston, S. C.	9	6:04 p. m.	7:06 p. m.	1.26	6:28 p. m.	6:55 p. m.	T.	0.31	0.59	0.90	1.13	1.22	1.25								
Do	31	1:01 p. m.	4:47 p. m.	1.88	1:08 p. m.	2:05 p. m.	0.01	0.18	0.37	0.64	0.74	0.83	0.89	0.91	0.94	0.97	1.03	1.48			
Charlotte, N. C.	5			1.08														0.71			
Chattanooga, Tenn.	2–3	9:50 p. m.	1:50 a. m.	1.66	10:27 p. m.	11:35 p. m.	0.01	0.06	0.12	0.29	0.49	0.71	0.89	1.02	1.16	1.26	1.34	1.42			
Chicago, Ill.	3–4	10:35 p. m.	1:30 a. m.	0.99	10:40 p. m.	11:15 p. m.	0.01	0.16	0.33	0.45	0.50	0.54	0.72	0.80	0.84						
Cincinnati, Ohio.	19	8:15 a. m.	9:45 a. m.	0.71	8:23 a. m.	8:55 a. m.	0.01	0.19	0.28	0.34	0.43	0.51	0.58	0.63	0.67						
Do	26	6:05 p. m.	7:15 p. m.	0.82	6:20 p. m.	7:05 p. m.	0.01	0.09	0.16	0.22	0.34	0.38	0.42	0.48	0.66	0.80					
Cleveland, Ohio.	29	6:03 p. m.	8:10 p. m.	1.19	6:09 p. m.	6:17 p. m.	T.	0.78	1.04	1.06	1.09	1.17									
Columbia, Mo.	26	D. N.	D. N.	0.88	1:45 a. m.	2:03 a. m.	0.15	0.25	0.43	0.52	0.71	0.72									
Columbia, S. C.	2–3	9:18 p. m.	D. N.	2.34	9:20 p. m.	10:15 p. m.	T.	0.05	0.35	0.61	0.84	1.03	1.20	1.41	1.51	1.61	1.66	1.74	1.91		
Do	3	1:54 p. m.	2:46 p. m.	0.59	1:58 p. m.	2:13 p. m.	T.	0.14	0.35	0.48	0.49										
Do	8	2:01 p. m.	4:09 p. m.	0.67	3:35 p. m.	3:50 p. m.	0.10	0.15	0.41	0.53	0.56										
Do	31	12:59 p. m.	2:16 p. m.	1.00	1:07 p. m.	1:30 p. m.	T.	0.22	0.59	0.74	0.84	0.92									
Columbus, Ohio.	19			0.17					0.17												
Concord, N. H.	20			1.02														0.44			
Corpus Christi, Tex.	20	7:40 p. m.	8:18 p. m.	0.56	7:52 p. m.	8:08 p. m.	T.	0.16	0.39	0.52	0.55	0.56									
Davenport, Iowa.	5	10:17 a. m.	11:57 a. m.	1.15	10:27 a. m.	10:57 a. m.	T.	0.12	0.50	0.80	0.88	0.94	1.05	1.10							
Denver, Colo.	22			0.62														0.62			
Des Moines, Iowa.	26–27	2:57 p. m.	8:25 a. m.	3.15	3:42 p. m.	3:57 p. m.	0.26	0.18	0.40	0.59	0.62										
Detroit, Mich.	26–27			1.83														0.43			
Dodge, Kans.	6	10:28 a. m.	12:07 p. m.	1.28	10:43 a. m.	11:21 a. m.	0.06	0.16	0.43	0.60	0.61	0.62	0.83	1.08	1.14	1.17					
Dubuque, Iowa.	5	6:45 a. m.	8:45 a. m.	0.92	7.08 a. m.	7:18 a. m.	0.04	0.29	0.49	0.52	0.55	0.56									
Duluth, Minn.	17			0.52														0.51			
Eastport, Me.	9			0.44														0.16			
Elkins, W. Va.	6			0.45														0.44			
Erie, Pa.	28			0.69														0.54			
Escanaba, Mich.	4–5			1.38														0.48			
Evansville, Ind.	5	6:48 p. m.	8:46 p. m.	1.09	6:50 p. m.	7:05 p. m.	T.	0.40	0.83	0.93	0.98	1.01									
Do	26	9:27 a. m.	11:48 a. m.	1.06	9:27 a. m.	10:10 a. m.	0.00	0.06	0.14	0.17	0.37	0.47	0.53	0.69	0.88	0.94	0.97				
Fort Smith, Ark.	‡	11:17 p. m.	D. N.	1.23	1:03 a. m.	1:42 a. m.	0.06	0.07	0.11	0.18	0.25	0.41	0.56	0.64	0.70	0.72	0.75	0.85	1.00		
Do	13	3:26 p. m.	5:10 p. m.	0.73	3:30 p. m.	4:00 p. m.	T.	0.17	0.34	0.47	0.56	0.64	0.69	0.71							
Do	28–29	8:55 p. m.	3:50 a. m.	1.07	2:36 a. m.	2:47 a. m.	0.42	0.07	0.32	0.59	0.65										
Fort Worth, Tex.	29			0.71														0.53			
Galveston, Tex.	14	3:20 p. m.	4:05 p. m.	0.63	3:25 p. m.	3:40 p. m.	T.	0.33	0.50	0.60	0.63										
Grand Junction, Colo.	13			0.01				0.01													
Grand Rapids, Mich.	26–27			1.94														0.63			
Green Bay, Wis.	3	11:30 a. m.	4:00 p. m.	1.02	2:30 p. m.	3:30 p. m.	0.10	0.23	0.39	0.45	0.46	0.46	0.46	0.46	0.47	0.56	0.69	0.89			
Harrisburg, Pa.	27–28			2.39														0.50			
Hatteras, N. C.	14	9:30 p. m.	11:50 p. m.	1.09	9:45 p. m.	10:13 p. m.	0.01	0.13	0.31	0.52	0.71	0.91	1.04								
Huron, S. Dak.	27–28			0.27														0.17			
Indianapolis, Ind.	3–4	10:23 p. m.	9:15 a. m.	1.51	5:55 a. m.	6:21 a. m.	0.46	0.13	0.25	0.53	0.75	0.84									
Jacksonville, Fla.	12	5:10 p. m.	8:40 p. m.	2.01	5:20 p. m.	6:40 p. m.	0.04	0.16	0.39	0.58	0.70	0.79	0.93	1.06	1.20	1.30	1.43	1.58	1.83		
Do	29	5:54 p. m.	7:52 p. m.	1.38	6:13 p. m.	7:20 p. m.	T.	0.09	0.18	0.28	0.39	0.49	0.64	0.82	0.95	1.01	1.10	1.20	1.37		
Jupiter, Fla.	7–8			0.69														0.40			
Kalispell, Mont.	22–23			0.31														0.13			
Kansas City, Mo.	13	1:48 a. m.	8:15 a. m.	2.09	2:35 a. m.	4.35 a. m.	0.10	0.06	0.13	0.19	0.27	0.46	0.50	0.58	0.60	0.67	0.75	0.77	0.84	1.02	1.35
Do	15	12:45 a. m.	5:30 a. m.	1.56	1:30 a. m.	2:05 a. m.	0.04	0.05	0.18	0.35	0.56	0.82	1.08	1.15							
Do	25	2:20 a. m.	5:15 a. m.	1.10	3:10 a. m.	3:28 a. m.	0.05	0.16	0.51	0.62	0.68										
Key West, Fla.	12	12:50 p. m.	5:00 p. m.	0.93	2:13 p. m.	2:28 p. m.	0.02	0.32	0.62	0.78											
Knoxville, Tenn.	5	D. N.	D. N.	0.86	4:05 a. m.	4:34 a. m.	0.01	0.11	0.25	0.53	0.68	0.78	0.84								
La Crosse, Wis.	3	7:30 a. m.	10:45 a. m.	1.07	7:37 a. m.	8:02 a. m.	0.01	0.33	0.43	0.52	0.59	0.91									
Lewiston, Idaho.	25–26			1.08														0.20			
Lexington, Ky.	19	12:17 p. m.	1:00 p. m.	0.42	12:37 p. m.	12:45 p. m.	0.01	0.31	0.41												
Lincoln, Nebr.	‡	11:40 p. m.	7:00 a. m.	2.00	12:00 m'd't	12:20 a. m.	T.	0.45	0.80	0.93	1.04										
Little Rock, Ark.	12	11:47 a. m.	1:45 p. m.	1.10	11:47 a. m.	12:22 p. m.	0.00	0.13	0.21	0.27	0.41	0.65	0.91	0.99							
Do	15	8:50 p. m.	10:45 p. m.	0.80	9:09 p. m.	9:24 p. m.	0.01	0.23	0.49	0.67											
Los Angeles, Cal.	25			T.														T.			
Louisville, Ky.	4	9:56 p. m.	D. N.	0.91	9:56 p. m.	10:16 p. m.	0.00	0.08	0.36	0.60	0.73										
Lynchburg, Va.	29–30	8:30 p. m.	1:20 p. m.	2.78	9:10 p. m.	10:20 p. m.	0.04	0.55	1.06	1.51	1.89	2.03	2.13								
Macon, Ga.	15	3:25 p. m.	5:35 p. m.	1.59	3:25 p. m.	3:45 p. m.	0.00	0.20	0.33	0.60	0.90										
Memphis, Tenn.	15	8:50 p. m.	9:45 p. m.	0.54	8:57 p. m.	9:05 p. m.	0.01	0.25	0.35												
Meridian, Miss.	16	11:40 a. m.	12:10 p. m.	1.14	11:43 a. m.	12:05 p. m.	0.02	0.15	0.53	0.82	1.00	1.11									
Do	19	8:10 p. m.	D. N.	0.91	8:20 p. m.	8:35 p. m.	T.	0.24	0.43	0.62											
Milwaukee, Wis.	29			0.91														0.60			
Montgomery, Ala.	19	6:32 p. m.	9:40 p. m.	3.16	6:32 p. m. 7:22 p. m.	7:22 p. m. 7:48 p. m.	0.00	0.15 2.43	0.45 2.47	0.75 2.60	1.07 2.74	1.36 2.84	1.59 2.90	1.88	2.12	2.28	2.37				
Nantucket, Mass.	4–5			0.72														0.16			
Nashville, Tenn.	10			0.53														0.42			
New Haven, Conn.	6			1.66														0.68			
New Orleans, La.	22	3:20 p. m.	5:55 p. m.	2.83	3:31 p. m. 5:11 p. m.	4:00 p. m. 5:40 p. m.	T. 1.42	0.28 0.20	0.54 0.49	0.84 0.78	1.09 1.10	1.18 1.35	1.22 1.41								
Do	25	1:16 p. m.	2:40 p. m.	1.03	1:27 p. m.	1:46 p. m.	0.01	0.40	0.78	0.89	1.00										
New York, N. Y.	4–5			2.65														0.49			
Norfolk, Va.	11	4:12 p. m.	6:55 p. m.	2.14	4:12 p. m.	4:40 p. m.	0.00	0.36	0.92	1.12	1.27	1.45	1.50	1.52							
Do	30	5:25 p. m.	5:55 p. m.	0.60	5:33 p. m.	5:41 p. m.	T.	0.46	0.60												
Northfield, Vt.	19–20			0.79														0.71			
North Head, Wash.	22			0.29														0.16			
Oklahoma, Okla.	13			0.65														0.63			
Omaha, Nebr.	24	7:42 p. m.	9:50 p. m.	1.96	8:43 p. m.	9:10 p. m.	0.57	0.11	0.39	0.57	0.90	1.17	1.27								
Do	26	4:25 p. m.	7:15 p. m.	3.49	4:26 p. m. 5:16 p. m.	5:16 p. m. 6:31 p. m.	T.	0.27 1.54	0.48 1.62	0.48 1.64	0.59 1.79	0.73 1.94	0.99 1.99	1.13 2.08	1.24 2.09	1.36 2.10	1.48 2.10	2.57	2.97		
Palestine, Tex.	24			0.34									0.34								
Parkersburg, W. Va.	19	3:00 p. m.	4:45 p. m.	2.21	3:00 p. m.	3:35 p. m.	0.00	0.15	0.23	0.90	1.37	1.75	1.91	1.98							
Pensacola, Fla.	7			0.58														0.57			

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Philadelphia, Pa	27–28			1.89														0.46			
Pittsburg, Pa	27–28			1.65														0.71			
Pocatello, Idaho	21	4:20 p. m.	4:55 p. m.	0.49	4:45 p. m.	4:53 p. m.	T.	0.35	0.49												
Portland, Me	20			0.43														0.21			
Portland, Oreg	22			0.39														0.38			
Pueblo, Colo	15	1:45 a. m.	4:15 a. m.	1.09	2:18 a. m.	2:30 a. m.	0.21	0.29	0.45	0.54											
Raleigh, N. C	15	3:55 a. m.	5:00 a. m.	1.01	4:15 a. m.	4:45 a. m.	0.13	0.18	0.32	0.38	0.46	0.67	0.81								
Richmond, Va	30			1.01														0.70			
Rochester, N. Y	25			0.94														0.39			
Sacramento, Cal. †																					
St. Louis, Mo	13	12:27 p. m.	1:36 p. m.	0.78	12:30 p. m.	1:15 p. m.	T.	0.03	0.04	0.07	0.09	0.18	0.34	0.50	0.66	0.75					
St. Paul, Minn	4–5			0.76														0.70			
Salt Lake City, Utah	19			0.15							0.14										
San Antonio, Tex	2			0.06											0.06						
San Diego, Cal	20			T.				T.													
Sandusky, Ohio	27	6:45 a. m.	7:45 p. m.	3.67	4:12 p. m.	4:53 p. m.	1.80	0.20	0.50	0.68	0.80	0.89	0.95	1.03	1.12	1.18	1.21	1.35			
San Francisco, Cal	14			T.				T.													
Savannah, Ga	15	12:27 p. m.	5:45 p. m.	2.08	12:54 p. m.	1:42 p. m.	0.02	0.37	0.52	0.75	0.76	0.77	0.77	0.77	0.87	1.13	1.36	1.48	1.68	1.72	1.73
Do	31	8:27 p. m.	10:30 p. m.	0.91	8:38 p. m.	9:08 p. m.	0.02	0.30	0.40	0.45	0.47	0.54	0.71	0.73							
Scranton, Pa	6			0.53														0.38			
Seattle, Wash	29			0.15														0.11			
Shreveport, La	18	D. N.	7:15 a. m.	1.30	4:28 a. m.	5:10 a. m.	0.17	0.14	0.24	0.29	0.31	0.38	0.45	0.57	0.73	0.82	0.86	0.88			
Spokane, Wash	23			0.45														0.41			
Springfield, Ill	5	3:13 p. m.	5:20 p. m.	1.29	3:18 p. m.	3:28 p. m.	0.05	0.14	0.39	0.44	0.47	0.49	0.55	0.63	0.69	0.71	0.74	0.80			
Syracuse, N. Y	11	2:20 p. m.	2:48 p. m.	0.48	2:31 p. m.	2:39 p. m.	0.01	0.25	0.47												
Tampa, Fla	4	5:00 p. m.	6:10 p. m.	2.39	5:05 p. m.	5:40 p. m.	T.	0.11	0.43	0.64	0.85	1.08	1.20	1.28	1.31						
Do	22	5:03 p. m.	9:30 p. m.	1.17	5:06 p. m.	5:35 p. m.	T.	0.16	0.32	0.48	0.66	0.81	0.94	0.98	1.00						
Taylor, Tex	3	4:15 p. m.	5:45 p. m.	1.22	4:45 p. m.	5:15 p. m.	0.11	0.08	0.18	0.33	0.53	0.81	1.05	1.07						*	
Toledo, Ohio	28	8:45 a. m.	12:20 p. m.	1.27	10:30 a. m.	11:08 a. m.	0.36	0.09	0.23	0.34	0.41	0.49	0.62	0.73	0.81	0.84					
Do	28–29	9:35 p. m.	D. N.	1.63	‖ 10:00 p. m.	10:50 p. m.	0.09	0.14	0.26	0.32	0.44	0.53	0.67	0.73	0.82	0.92	1.06				
					‖ 10:50 p. m.	11:10 p. m.		1.14	1.19	1.29	1.40	1.45	1.47								
Topeka, Kans	2	3:10 a. m.	10:00 a. m.	4.59	§ 8:00 a. m.	8:50 a. m.	1.30	0.13	0.29	0.46	0.63	1.12	1.51	1.67	1.89	2.15	2.45				
					§ 8:50 a. m.	9:10 a. m.		2.78	2.92	3.00	3.06	3.11	3.12								
Do	5–6	10:00 p. m.	6:30 a. m.	3.35	10:53 p. m.	11:48 p. m.	0.05	0.14	0.22	0.33	0.56	0.67	0.79	0.86	0.92	1.03	1.30	1.66			
Valentine, Nebr	2	2:35 p. m.	7:25 p. m.	2.42	2:45 p. m.	3:45 p. m.	0.03	*													
Vicksburg, Miss	24	4:55 p. m.	5:40 p. m.	0.84	5:03 p. m.	5:25 p. m.	0.02	0.16	0.43	0.56	0.68	0.79	0.82								
Washington, D. C	28–29	7:46 p. m.	5:30 a. m.	0.84	8:43 p. m.	9:09 p. m.	T.	0.12	0.17	0.37	0.58	0.71	0.73								
Wichita, Kans	1	4:13 a. m.	10:15 a. m.	1.99	4:15 a. m.	4:43 a. m.	0.01	0.58	0.70	0.97	1.10	1.22	1.30								
Wilmington, N. C	13	8:40 a. m.	12:20 p. m.	1.54	10:33 a. m.	10:43 a. m.	0.66	0.37	0.67	0.72	0.74	0.75									
Do	20	12:05 a. m.	2:30 p. m.	3.77	2:28 a. m.	4:07 a. m.	0.14	0.11	0.30	0.49	0.50	0.59	0.71	0.93	1.11	1.16	1.16	1.30	1.94	2.26	2.37
Wytheville, Va	29	8:23 p. m.	10:00 p. m.	0.63	8:25 p. m.	8:37 p. m.	0.01	0.28	0.47	0.50	0.54										
Yankton, S. Dak	26			1.31														0.33			
Bridgetown, Barbados	17			0.68														0.56			
Cienfuegos, Cuba	4	1:31 p. m.	6:10 p. m.	1.00	3:33 p. m.	3:48 p. m.	0.27	0.23	0.51	0.57	0.59	0.60									
Havana, Cuba	23	3:29 p. m.	6:50 p. m.	1.90	4:35 p. m.	5:55 p. m.	T.	0.07	0.14	0.42	0.48	0.50	0.64	0.86	1.00	1.01	1.01	1.39	1.86	1.89	
Puerto Principe, Cuba	31	5:10 p. m.	6:20 p. m.	1.14	5:15 p. m.	5:40 p. m.	0.01	0.14	0.45	0.59	0.82	0.95	1.01								
San Juan, Porto Rico	17	10:45 a. m.	6:00 p. m.	2.58	12:56 p. m.	1:20 p. m.	1.07	0.14	0.32	0.63	0.70	0.78	0.80								
Santo Domingo, W. I.	18	11:30 a. m.	10:00 p. m.	2.94	2:00 p. m.	2:38 p. m.	0.60	0.13	0.27	0.35	0.50	0.57	0.66	0.73	0.83	0.86	0.89				

* Self register out of order. † No precipitation during the month. ‡ July 31 to August 1.

TABLE VI.—*Data furnished by the Canadian Meteorological Service, August, 1903.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Depth of snow.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F	29.81	29.94	—.02	55.1	— 4.7	62.4	47.8	2.32	—1.76	.....
Sydney, C. B. I	29.97	30.01	+.06	59.0	— 4.3	68.0	50.0	1.66	—1.96	.....
Halifax, N. S	29.90	30.00	+.04	61.1	— 2.5	69.7	52.5	4.25	—0.10	.....
Grand Manan, N. B	29.95	30.00	+.05	59.2	— 2.3	66.2	52.2	2.08	—1.58	.....
Yarmouth, N. S	29.95	30.02	+.05	58.4	— 1.8	65.6	51.2	4.66	+0.65	.....
Charlottetown, P. E. I	29.93	29.97	+.03	61.6	— 2.7	70.6	52.7	2.22	—1.52	.....
Chatham, N. B	29.92	29.94	+.01	60.0	— 3.2	70.9	49.1	5.03	+0.99	.....
Father Point, Que	29.91	29.93	+.02	55.2	— 0.4	62.4	48.2	5.12	+2.07	.....
Quebec, Que	29.65	29.97	+.04	59.8	— 3.3	68.6	51.0	2.10	—1.73	.....
Montreal, Que	29.78	29.98	+.03	62.1	— 4.3	69.5	54.6	3.17	—0.40	.....
Bissett, Ont	29.38	29.98	+.02	58.4	— 4.8	70.1	46.8	4.00	+1.05	.....
Ottawa, Ont	29.64	29.94	—.02	62.4	— 2.4	71.1	53.7	4.00	+0.97	.....
Kingston, Ont	29.66	29.97	—.01	62.6	— 4.4	70.0	55.3	3.85	+1.47	.....
Toronto, Ont	29.60	29.97	—.02	63.7	— 2.3	72.1	55.4	3.67	+0.91	.....
White River, Ont	28.72	30.02	+.06	56.0	— 0.4	68.1	43.9	3.03	—0.27	.....
Port Stanley, Ont	29.34	29.98	—.02	64.0	— 1.9	73.3	54.6	3.00	+0.58	.....
Saugeen, Ont	29.28	29.98	—.01	62.6	— 1.2	70.9	54.3	4.00	+1.75	.....
Parry Sound, Ont	29.28	29.96	—.02	61.4	— 2.1	70.3	52.5	3.56	+0.84	.....
Port Arthur, Ont	29.30	30.01	+.05	57.3	— 2.2	66.5	48.0	1.97	—0.78	.....
Winnipeg, Man	29.16	29.99	+.05	61.2	— 2.2	72.5	49.8	2.00	—0.67	.....
Minnedosa, Man	28.22	30.01	+.07	59.9	+ 0.5	69.3	50.5	3.94	+1.84	.....
Qu'Appelle, Assin	27.75	29.98	+.05	58.9	— 2.6	69.0	48.9	5.03	+3.39	.....
Medicine Hat, Assin	27.68	29.92	.00	63.5	— 2.2	75.5	51.6	1.80	+0.13	.....
Swift Current, Assin	27.44	29.97	+.04	60.3	— 3.7	69.9	50.7	3.04	+1.13	.....
Calgary, Alberta	26.44	29.94	+.03	55.4	— 4.0	65.5	45.4	7.70	+5.56	.....
Banff, Alberta	25.43	29.97	+.06	53.4	— 2.9	64.2	42.7	3.75	+1.22	.....
Edmonton, Alberta	27.71	29.98	+.06	57.3	— 1.5	66.9	47.7	4.33	+2.20	.....
Prince Albert, Sask	28.44	29.98	+.06	57.0	— 1.9	66.8	47.1	2.22	+0.07	.....
Battleford, Sask	28.28	30.00	+.09	58.6	— 4.0	69.1	48.2	2.25	—0.11	.....
Kamloops, B. C										
Victoria, B. C	29.91	30.00	—.01	59.6	+ 0.9	66.4	52.7	1.06	+0.46	.....
Barkerville, B. C	25.71	29.99	+.09	51.2	— 5.1	62.8	39.6	6.42	+3.32	.....
Hamilton, Bermuda	29.94	30.10	.00	81.2	— 1.6	88.0	74.4	3.85	—2.23	.....
Dawson City, Yukon										

TABLE VII.—*Heights of rivers referred to zeros of gages, August, 1903.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn	1,954	14	6.3	8	3.8	28	5.1	2.5
Red Wing, Minn	1,914	14	5.7	10, 11	3.4	31	4.6	2.3
Reeds Landing, Minn	1,884	12	5.5	10	3.3	30, 31	4.3	2.2
La Crosse, Wis	1,819	12	6.7	11–13	5.0	24, 25	5.8	1.7
Prairie du Chien, Wis	1,759	18	7.3	17, 18	5.6	26	6.3	1.7
Dubuque, Iowa	1,699	15	7.8	17–20	6.3	9, 10	7.2	1.5
Leclaire, Iowa	1,609	10	5.6	7	4.2	11, 12	4.7	1.4
Davenport, Iowa	1,593	15	7.1	7	5.3	12, 13	5.9	1.8
Muscatine, Iowa	1,562	16	8.4	8	6.6	13	7.3	1.8
Galland, Iowa	1,472	8	4.3	1	3.4	{5, 17, 18, 25–27}	3.7	0.9
Keokuk, Iowa	1,463	15	7.9	30, 31	5.8	26	6.7	2.1
Hannibal, Mo.	1,402	13	9.8	31	7.3	27	7.8	2.5
Grafton, Ill.	1,306	23	11.9	1	8.8	27	9.8	3.1
St. Louis, Mo.	1,264	30	18.1	22	14.5	6	16.7	3.6
Chester, Ill	1,189	30	14.8	22	12.5	7	13.9	2.3
New Madrid, Mo.	1,003	34	16.9	1	13.1	31	15.2	3.8
Memphis, Tenn	843	33	14.3	1	9.9	31	12.0	4.4
Helena, Ark.	767	42	20.9	1	15.5	31	17.9	5.4
Arkansas City, Ark.	635	42	22.9	2	18.4	13, 14	20.4	4.5
Greenville, Miss.	595	42	18.5	2, 3	14.9	13	16.4	3.6
Vicksburg, Miss.	474	45	21.2	1	17.4	14–16	19.0	3.8
Natchez, Miss.	373	46	21.9	1	18.1	16	19.7	3.8
Baton Rouge, La.	240	35	14.5	1	10.4	18	12.0	4.1
Donaldsonville, La	188	28	10.6	1	7.3	17, 18	8.5	3.3
New Orleans, La.	108	16	7.3	1	5.5	20, 21	6.1	1.8
Yellowstone River.								
Glendive, Mont.	98	17	6.3	3	2.2	23, 24	3.6	4.1
James River.								
Lamoure, N. Dak.	.....	25	—0.2	28–31	— 0.5	12–16	—0.4	0.3
Huron, S. Dak	210	9	1.0	16	0.7	{2, 21, 22, 27, 28}	0.8	0.3
Missouri River.								
Townsend, Mont.	2,504	10	4.0	3	3.3	26–31	3.5	0.7
Fort Benton, Mont	2,285	12	1.6	2	0.6	19–21	1.0	1.0
Bismarck, N. Dak	1,309	14	6.1	7	2.7	27	4.2	3.4
Pierre, S. Dak	1,114	14	6.4	1	4.5	31	5.5	1.9
Sioux City, Iowa	784	19	11.7	1	8.2	27	9.8	3.5
Omaha, Nebr.	669	18	11.5	2	9.2	26	10.4	2.3
St. Joseph, Mo.	481	10	10.3	31	5.7	26, 27	7.6	4.6
Kansas City, Mo.	388	21	17.9	30	12.2	1	15.1	5.7
Boonville, Mo.	199	20	15.7	31	10.9	2, 3	13.1	4.8
Hermann, Mo.	103	24	14.7	20	10.4	2, 4	12.8	4.3
Chippewa River.								
Chippewa Falls, Wis	90	16	7.4	8	1.0	1, 28	2.8	6.4
Illinois River.								
Peoria, Ill.	135	14	9.2	30, 31	8.4	3, 24–26	8.8	0.8
Youghiogheny River.								
Confluence, Pa.	59	10	1.0	1, 31	0.0	18–28	0.3	1.0
West Newton, Pa.	15	23	1.0	4	0.1	18, 19	0.5	0.9
Allegheny River.								
Warren, Pa.	177	14	5.0	30	0.7	28	1.5	4.3
Oil City, Pa	123	13	5.2	31	0.8	23	1.6	4.4
Parker, Pa.	73	20	6.9	31	0.5	27	1.6	6.4
Freeport, Pa	29	20	10.7	29	1.4	20	3.6	9.3
Clarion River.								
Clarion, Pa.	32	10	2.9	30	0.3	15	1.2	2.6
Monongahela River.								
Weston, W. Va.	161	18	—0.2	2	— 1.3	21–25	—1.0	1.1
Fairmont, W. Va.	119	25	2.0	31	1.0	{1–4, 14–16, 25, 26, 30}	1.3	1.0
Greensboro, Pa	81	18	7.0	3, 4	6.2	{18–22, 28–30}	6.5	0.8
Lock No. 4, Pa.	40	28	8.4	7	6.8	1	7.7	1.6
Conemaugh River.								
Johnstown, Pa.	64	7	4.4	29	1.0	19	1.9	3.4
Red Bank Creek.								
Brookville, Pa.	35	8	1.1	29	—0.3	18–27	0.2	1.4
Beaver River.								
Ellwood Junction, Pa.	10	14	7.2	28	1.8	27	2.7	5.4
Great Kanawha, River.								
Charleston, W. Va.	58	30	7.4	4	6.5	31	6.9	0.9
Little Kanawha River.								
Glenville, W. Va	103	20	3.0	1	— 2.3	29	—0.5	5.3
New River.								
Radford, Va	155	14	3.0	2	0.0	1, 25–31	0.7	3.0
Hinton, W. Va.	95	14	3.0	2	1.2	28, 29	1.7	1.8
Cheat River.								
Rowlesburg, W. Va.	36	14	3.0	21	1.2	{17, 18, 27–29}	1.7	1.8
Ohio River.								
Pittsburg, Pa.	966	22	7.9	29	4.7	30	6.0	3.2
Davis Island Dam, Pa.	960	25	9.3	29	2.4	21	3.9	6.9
Beaver Dam, Pa	925	27	13.7	29	2.9	25, 26	5.1	10.8
Wheeling, W. Va.	875	36	11.9	30	2.4	27	4.4	9.5
Parkersburg, W. Va.	785	36	11.3	31	2.8	29	4.5	8.5
Point Pleasant, W. Va.	703	39	8.5	31	1.8	24, 28–30	3.1	6.7
Huntington, W. Va.	660	50	8.6	5	4.2	29	5.7	4.4
Catlettsburg, Ky.	651	50	7.9	5	2.1	25	3.7	5.8
Portsmouth, Ohio	612	50	8.2	6	3.4	29	5.1	4.8
Cincinnati, Ohio.	499	50	9.1	1	5.0	29	6.7	4.1
Madison, Ind	413	46	9.1	1	3.9	29–31	6.2	5.2
Louisville, Ky	367	28	5.5	1	3.3	28, 29	4.1	2.2
Evansville, Ind.	184	35	8.6	1	3.8	31	5.8	4.8
Paducah, Ky.	47	40	7.9	12	3.7	31	6.0	4.2
Cairo, Ill.	1,073	45	19.8	1	15.4	31	18.0	4.4
Muskingum River.								
Zanesville, Ohio	70	20	8.4	31	5.5	{1, 8–11, 16–18, 29}	5.8	2.9
Scioto River.								
Columbus, Ohio.	110	17	2.6	1–5	1.9	21–31	2.1	0.7
Miami River.								
Dayton, Ohio[1]	77	18	1.0	1–3	0.6	25, 28, 30	0.8	0.4
Wabash River.								
Mount Carmel, Ill.	50	15	6.9	8	1.3	29–31	2.7	5.6
Licking River.								
Falmouth, Ky.	30	25	2.0	7, 15	0.4	25–28	1.2	1.6
Kentucky River.								
High Bridge, Ky.	117	17	10.5	6	9.0	{14, 17, 18, 21–24, 26, 28, 29}	9.4	1.5
Frankfort, Ky.	65	31	6.9	5, 6	5.2	27	6.1	1.7
Clinch River.								
Speers Ferry, Va.	156	20	0.0	3	— 1.0	31	—0.7	1.0
Clinton, Tenn.	52	25	4.8	13	2.8	28	3.7	2.0
Holston River.								
Bluff City, Tenn.	170	15	0.7	12, 18	0.2	25–30	0.4	0.5
Rogersville, Tenn.	103	14	2.1	7	1.4	24–28, 30, 31	1.6	0.7
French Broad River.								
Asheville, N. C.	144	6	1.0	5	— 0.4	29	0.0	1.4
Leadvale, Tenn.	70	15	0.7	4	— 1.0	28	—0.2	1.7
Hiwassee River.								
Charleston, Tenn	18	22	3.6	3, 6	0.9	29, 30	1.8	2.7
Tennessee River.								
Knoxville, Tenn.	635	29	2.7	5	0.5	29, 31	1.3	2.2
Kingston, Tenn.	556	25	2.7	16	1.1	31	1.9	1.6
Chattanooga, Tenn.	452	33	4.9	7	1.6	29, 30	3.0	3.3
Bridgeport, Ala.	402	24	3.0	8	0.7	30, 31	1.7	2.3
Florence, Ala.	255	16	2.5	7, 9, 10	0.4	31	1.5	2.1
Riverton, Ala.	225	25	3.0	10	— 0.4	31	1.5	3.4
Johnsonville, Tenn.	95	24	4.0	11	1.7	31	2.9	2.3
Cumberland River.								
Burnside, Ky.	516	50	5.4	14	2.1	31	3.4	3.3
Carthage, Tenn.	305	40	4.1	9, 16	1.4	1	2.7	2.7
Nashville, Tenn	189	40	5.6	11, 12, 18	2.1	3	3.8	3.5
Clarksville, Tenn.	126	42	7.3	13	3.4	4, 5	5.2	3.9
Arkansas River.								
Wichita, Kans.	832	10	2.5	5, 12	1.2	30, 31	1.9	1.3
Webbers Falls, Ind. T.	465	23	7.8	21	3.1	4, 31	5.3	4.7
Fort Smith, Ark.	403	22	8.5	15	2.8	5	5.5	5.7
Dardanelle, Ark.	256	21	8.2	17	2.8	7	5.2	5.4
Little Rock, Ark.	176	23	9.4	18	4.6	4, 5, 9	6.6	4.8
White River.								
Newport, Ark.	150	26	3.6	18	1.5	30, 31	2.7	2.1
Yazoo River.								
Yazoo City, Miss.	80	25	2.5	20	— 0.6	1, 2	0.8	3.1
Red River.								
Arthur City, Tex.	638	27	9.0	13	5.5	31	6.3	3.5
Fulton, Ark.	515	28	12.8	17	7.5	31	10.0	5.3
Shreveport, La.	327	29	6.1	7	2.0	30, 31	4.4	4.1
Alexandria, La.	118	33	7.2	24–26	4.4	17, 18	6.1	2.8
Ouachita River.								
Camden, Ark.	304	39	19.7	21	5.2	10	10.6	14.5
Monroe, La.	122	40	12.3	25	3.0	3, 4	7.1	9.3
Atchafalaya River.								
Melville, La.	100	31	22.0	1	17.2	19	19.3	4.8
Passaic River.								
Chatham, N. J	69	.....	4.8	6, 7	2.4	23–25	3.2	2.4
Pompton River.								
Pompton Plains, N. J	6	.....	5.1	7	4.0	{2–4, 17–19, 23–25}	4.3	1.1
Susquehanna River.								
Binghamton, N. Y.	306	16	11.9	30	3.1	4, 19, 20, 25	4.2	8.8
Towanda, Pa.	262	16	15.2	30	1.0	19	2.8	14.2
Wilkesbarre, Pa	183	17	20.0	30	3.7	20	6.0	16.3
Harrisburg, Pa	69	17	9.2	31	2.2	26–28	3.4	7.0
West Branch Susquehanna.								
Lockhaven, Pa	65	12	3.2	30	— 0.4	25	0.4	3.6
Williamsport, Pa.	39	20	7.2	30	1.4	26	2.6	5.8
Juniata River.								
Huntingdon, Pa.	90	24	8.9	28	3.0	24, 25	3.7	5.9
Shenandoah River.								
Riverton, Va	58	22	— 0.1	20	— 0.5	21	—0.3	0.4
Potomac River.								
Cumberland, Md.	290	8	3.5	30	2.1	15–18	2.5	1.4
Harpers Ferry, W. Va.	172	18	2.0	8, 30	0.4	28	1.0	1.6
James River.								
Lynchburg, Va	260	18	2.5	30	0.1	28, 29	0.9	2.4
Richmond, Va.	111	12	5.0	31	— 0.3	2	0.5	5.3
Dan River.								
Danville, Va	55	8	1.2	2	0.0	28–29	0.5	1.2
Roanoke River.								
Clarksville, Va	196	12	6.2	2	3.2	29	3.9	3.0
Weldon, N. C.	129	30	16.3	31	9.0	28, 29	10.5	7.3
Cape Fear River.								
Fayetteville, N. C.	112	38	7.4	16	1.7	31	3.8	5.7
Edisto River.								
Edisto, S. C.	75	6	5.9	26	3.0	1	5.0	2.9
Pedee River.								
Cheraw, S. C.	149	27	12.1	20	1.7	31	4.4	10.4
Black River.								
Kingstree, S. C.	52	12	7.0	30, 31	1.7	8–10	4.1	5.3
Lynch Creek.								
Effingham, S. C.	35	12	10.5	25	3.0	1	5.1	7.5
Santee River.								
St. Stephens, S. C.	97	12	8.6	27	2.5	1	7.1	6.1
Congaree River.								
Columbia, S. C.	37	15	6.0	15, 20	0.9	14, 30, 31	2.9	5.1
Wateree River.								
Camden, S. C.	45	24	18.3	19	6.0	28–31	9.6	12.3
Waccamaw River.								
Conway, S. C.	40	7	6.0	26	1.3	12	3.4	4.7
Savannah River.								
Calhoun Falls, S. C.	347	15	6.9	19	2.9	28, 29, 31	3.4	4.0
Augusta, Ga.	268	32	16.5	19	7.5	29–31	9.8	9.0
Broad River.								
Carlton, Ga.	30	11	7.3	18	2.3	30, 31	3.2	5.0
Flint River.								
Albany, Ga.	80	20	10.2	25	2.1	5	5.8	8.1

TABLE VII.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Chattahoochee River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Oakdale, Ga	305	18	6.0	3	0.0	27-31	2.5	6.0
Westpoint, Ga	239	20	5.7	19	2.3	28-31	3.3	3.4
Ocmulgee River.								
Macon, Ga	125	18	11.2	30	2.7	30, 31	4.8	8.5
Abbeville, Ga	50	11	8.8	25, 26	2.8	31	5.7	6.0
Oconee River.								
Dublin, Ga	79	20	9.1	23	0.5	31	2.9	8.6
Coosa River.								
Rome, Ga	271	30	6.2	6	1.2	31	2.5	5.0
Gadsden, Ga	144	18	5.5	7	0.2	31	1.9	5.3
Alabama River.								
Montgomery, Ala	265	35	6.5	20	0.5	29	3.4	6.0
Selma, Ala	212	35	7.7	21	1.5	31	4.5	6.2
Tombigbee River.								
Columbus, Miss	303	33	− 0.8	14	− 3.3	31	−2.1	2.5
Demopolis, Ala	155	35	4.5	3	− 1.2	31	2.0	5.7
Black Warrior River.								
Tuscaloosa, Ala	90	43	8.5	3	4.9	29	6.3	3.6
Sabine River.								
Logansport, La	.....	.....	13.1	7	3.1	16-18	7.1	10.0
Orange, Tex	.....	7	1.9	13, 14	1.0	1-3, 24-27	1.4	0.9
Neches River.								
Rockland, Tex	.....	20	6.9	23	0.8	2	3.5	6.1
Beaumont, Tex	.....	.....	.....	.....	.....	.....	.....	.....
Trinity River.								
Dallas, Tex	330	25	5.7	1	2.4	12, 13	3.2	3.3
Riverside, Tex	.....	40	24.0	11, 12	0.8	31	9.7	23.2
Liberty, Tex	.....	.....	.....	.....	.....	.....	.....	.....
Brazos River.								
Kopperl, Tex	369	21	3.2	12	− 1.0	21-31	0.0	4.2
Waco, Tex	301	24	6.1	1	2.5	27-31	3.5	3.6
Hempstead, Tex	.....	40	31.5	3	0.7	31	10.0	30.8
Booth, Tex	76	39	25.3	4	2.5	31	10.8	22.8
Colorado River.								
Ballinger, Tex	.....	21	2.3	31	0.7	13	1.2	1.6
Austin, Tex	214	18	3.4	1	1.2	31	1.9	2.2
Columbus, Tex	.....	24	34.9	1	7.3	31	11.2	27.6
Red River of the North.								
Moorhead, Minn	418	26	7.5	31	7.0	24-28	7.2	0.5
Columbia River.								
Umatilla, Oreg	270	25	11.7	1	7.4	31	9.1	4.3
The Dalles, Oreg	166	40	18.2	1	10.5	31	13.4	7.7
Willamette River.								
Albany, Oreg	118	20	1.6	25	1.0	19-22, 31	1.2	0.6
Portland, Oreg	12	15	9.0	1	4.5	31	6.6	4.5
Sacramento River.								
Red Bluff, Cal	265	23	0.2	1-3	0.0	19-31	0.1	0.2
Sacramento, Cal	64	29	8.0	1-5	7.2	31	7.6	0.8

[1] 18 days only.

HAWAIIAN CLIMATOLOGICAL DATA.

By R. C. LYDECKER, Acting Territorial Meteorologist.

Rainfall data for August, 1903.

Stations.	Elevation.	Amount.
HAWAII.		
HILO, e. and ne.	*Feet.*	*Inches.*
Waiakea	50	7.32
Hilo (town)	100	8.11
Kaumana	1,250	10.93
Pepeekeo	100	9.42
Hakalau	200	9.23
Honohina	300	9.66
Puuohua	1,050	17.87
Laupahoehoe	500	9.50
Ookala	400	5.55
HAMAKUA, ne.		
Kukaiau	250	4.76
Paauilo	300	2.64
Paauhau	300	1.83
Honokaa (Mill)	425	2.22
Honokaa (Meinicke)	1,100	2.13
Kukuihaele	700	3.06
KOHALA, n.		
Awini Ranch	1,100	10.68
Niulii	200	5.25
Kohala (Mission)	521	5.38
Kohala (Sugar Co.)	270	4.47
Hawi, Mill	700	4.97
Puakea Ranch	600	3.53
Puuhue Ranch	1,847	2.43
Waimea	2,720	1.74
KONA, w.		
Huehue	2,000	2.20
Holualoa	1,350	.....
Kaukahoku Leheula	3,500	.....
Kainaliu	1,470	.....
Kealakekua	1,580	10.79
Napoopoo	25	5.66
Hoopuloa	1,650	7.35
Hoopuloa	2,500	8.65
Puuwaawaa Ranch	2,700	1.78
Huehue	2,000	.....
KAU, se.		
Kahuku Ranch	1,680	.....
Honuapo	15	0.64
Naalehu	650	2.04
Hilea	310	0.50
Pahala	850	.....
Moaula	1,700	.....
Volcano House	4,000	2.47
PUNA, e.		
Olaa, Mountain View (Russel)	1,600	.....
Olaa (Plantation)	.....	.....
Kapoho	110	.....
Pahoa	600	7.02
MAUI.		
Lahaina	40	.....
Waiopae Ranch	700	.....
Kaupo (Mokulau), s	285	7.28
Kipahulu, s	308	10.42
Nahiku, ne	850	19.75
Nahiku	1,600	.....
Haiku, n	700	5.06
Kula (Waiakoa), n	2,700	1.75
Kula (Erehwon), n	4,000	.....
MAUI—Cont'd.		
Puuomalei, n	1,400	4.06
Paia	180	1.69
Haleakala Ranch	2,000	.....
Wailuku, ne	250	0.26
OAHU.		
Punahou (W. R.), sw	47	2.45
Kulaokahua (Castle), sw	50	1.75
Makiki Reservoir	120	2.71
U. S. Naval Station, sw	6	2.51
Kapiolani Park, sw	10	0.35
College Hills	175	4.05
Manoa (Woodlawn Dairy), e	285	10.17
Manoa (Rhodes Gardens)	360	12.72
School street (Bishop), sw	.....	.....
Insane Asylum, sw	30	2.13
Kamehameha School	.....	.....
Kalihi-Uka, sw	485	.....
Nuuanu (W. W. Hall), sw	50	2.91
Nuuanu (Wyllie street)	250	.....
Nuuanu (Elec. Station), sw	405	5.92
Nuuanu (Luakaha), e	850	15.44
U. S. Experiment Station	350	3.94
Laniakea (Nahuina)	1,150	11.37
Tantalus Heights	1,360	12.75
Waimanalo, ne	25	1.16
Maunawili, ne	300	6.00
Kaneohe	100	3.61
Ahuimanu, ne	350	6.38
Kahuku, n	25	1.44
Waialua	37	.....
Wahiawa	900	2.86
Ewa Plantation, s	60	0.18
U. S. Magnetic Station	45	0.29
Waipahu	200	0.00
Moanalua	15	1.34
Pacific Heights	700	.....
KAUAI.		
Lihue (Grove Farm), e	200	2.17
Lihue (Molokoa), e	300	1.58
Lihue (Kukaua), e	1,000	5.00
Kealia, e	15	.....
Kilauea, ne	325	2.75
Hanalei, n	10	5.95
Waioli	15	.....
Haena	15	.....
Waiawa	32	.....
Eleele	.....	.....
Wahiawa (Mountain)	3,000	12.70
McBryde (Residence)	850	3.12
Lawai (Gov. Road)	450	5.62
Lawai, w	225	1.12
Lawai, e	800	5.47
Koloa	100	1.83
Delayed July reports.		
Nahiku	1,600	40.58
Hoopuloa	2,500	12.12
Hoopuloa	1,650	9.31
Hilo	.....	22.22

NOTE.—The letters n, s, e, w, and c show the exposure of the station relative to the winds.

Meteorological Observations at Honolulu, August, 1903.

The station is at 21° 18′ N., 157° 50′ W. It is the Hawaiian Weather Bureau station Punahou. (See fig. 2, No. 1, in the MONTHLY WEATHER REVIEW for July, 1902, page 365.)

Hawaiian standard time is $10^h\ 30^m$ slow of Greenwich time. Honolulu local mean time is $10^h\ 31^m$ slow of Greenwich.

The pressure is corrected for temperature and reduced to sea level, and the gravity correction, −0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

Rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m. Greenwich time, or 2:30 a. m. Honolulu time.									
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		Total rainfall at 9 a. m., local time.
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	29.96	74	68.5	81	72	67.3	76	ne.	3	4	30.02	29.95	0.02
2	29.96	77	70	83	71	66.0	70	ne.	3	2	30.02	29.94	0.06
3	30.05	75	68.5	82	74	66.3	69	ne.	3	3	30.06	29.96	0.03
4	30.00	77	71	83	71	66.7	71	ne.	3-4	2-8	30.08	29.99	0.09
5	30.00	76	71	83	74	69.5	75	ne.	4-1	2-7	30.04	29.94	0.01
6	29.95	77	71.5	84	74	69.5	76	ene.	1	7-4	30.00	29.93	0.00
7	30.00	76	70	85	73	68.3	70	ene.	1	8-4-7	30.02	29.92	0.00
8	30.02	76	69	85	72	68.7	70	ene.-ne.	1	1-7-3	30.06	29.95	0.06
9	30.01	78	69	85	73	66.5	67	ne.	2-3	1-2	30.06	29.99	0.03
10	29.98	76	68	83	75	64.5	63	ne.	4	2	30.05	29.95	0.01
11	29.94	72	68.5	83	74	62.7	62	nne.	1-0	2	30.00	29.90	0.03
12	29.95	75	68	83	70	65.5	69	ne.	1-2	1	30.00	29.90	0.03
13	29.94	76	69.5	84	70	64.5	64	nne.-ne.	1-2-0	1	30.00	29.90	0.00
14	29.97	77	72	85	73	68.7	72	ne.	1-2	1-7	30.00	29.90	0.02
15	30.01	76	71	85	73	67.3	69	ne.	0-3-1	4-7	30.05	29.97	0.01
16	30.00	77	68.5	82	74	67.7	73	ne.	1-2 0	5-8	30.06	29.96	T.
17	29.98	75	68.5	83	74	65.5	68	ne.	2-0	4-8	30.03	29.95	T.
18	30.02	76	69	83	72	68.0	73	ne.	1-0	4-7	30.06	29.96	0.00
19	30.05	76	70	83	75	66.3	69	ne.	2	3	30.06	29.98	T.
20	30.05	75	67	84	75	65.7	67	ne.	2-3	2	30.08	30.00	0.00
21	30.01	75	67	83	71	64.0	66	ne.	2	4-7	30.06	29.99	0.15
22	30.00	71	69	84	73	63.7	65	ne.	2-4	5	30.05	29.97	0.13
23	30.03	74	69	82	72	68.5	76	ne.	3	4-6	30.05	30.00	0.27
24	30.03	73	70	83	72	68.0	77	ne.	2-0	4-7	30.05	30.00	0.28
25	30.01	75	68	82	70	68.3	79	ne.	3-0	9-4	30.06	29.98	0.39
26	30.04	76	69	83	72	66.7	72	ne.	2	5	30.05	29.99	0.15
27	30.02	75	67	84	73	67.5	72	ne.	2-3	5	30.06	30.01	0.20
28	30.00	74	69	84	74	65.5	69	ne.	3	4-7	30.06	29.99	0.19
29	30.00	76	69	83	73	65.3	69	ne.	4	4	30.04	29.96	0.14
30	30.01	76	69	82	74	67.0	71	ne.	3-5	3	30.04	29.96	0.10
31	30.00	75	69	83	73	65.7	68	ne.	3-4	3	30.04	29.96	0.05
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.45
Means	29.999	75.4	69.1	83.3	72.7	66.6	70.2	.....	2.1	4.1	30.042	29.958	.....
Departure	+.022	.....	.....	.....	.....	+0.6	+1.7	.....	.....	+0.1	.....	.....	+0.48

Mean temperature for the month of August, 1903, $(6+2+9)+3=77.9°$; normal is 77.7°.
Mean pressure for the month of August, 1903, $(9+3)+2=30.001$; normal is 29.979.

* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 4.31 p. m., Greenwich time. ‡ These values are the means of $(6+9+2+9)+4$. § Beaufort scale.

Maximum thermometer set at 9 p. m. and minimum at 2 p. m., local time.

Temperature table for August, 1903.

Stations.	Elevation.	Mean max.	Mean min.	Cor. av'ge.	Highest.	Lowest.
	Feet.	°	°	°	°	°
Hilo	40	85.7	68.6	76.4	88	65
Pepeekeo	100	79.0	71.0	74.3	82	69
Kohala	521	80.0	68.3	73.5	84	67
Naalehu	650	78.0	65.0	70.8	81	61
Waimea	2,730	73.5	62.4	67.3	81	60
Volcano house	4,000	73.2	54.8	63.3	80	51
Waikiki	15	83.3	73.6	77.8	86	72
United States Magnetic Station	50	87.5	70.5	78.3	89	68
W. R. Castle	50	83.4	73.6	77.8	86	68
United States Experimental Station	350	84.2	71.3	77.0	88	69

GENERAL SUMMARY FOR AUGUST, 1903.

Honolulu.—Temperature mean for the month, 77.9°; normal, 77.7°; average daily maximum, 83.3°; average daily minimum, 72.7°; mean daily range, 10.6°; greatest daily range, 14°; least daily range, 8°; highest temperature, 85°; lowest temperature, 70°.

Barometer average, 30.001; normal, 29.979; highest, 30.08; lowest, 29.90; greatest 24-hour change, that is from any given hour on one day to the same hour on the next, .06; lows passed this point, 10th to 13th; highs, 3d. Pressure steady through the month.

Relative humidity average, 70.2 per cent; normal, 68.5 per cent; mean dew-point, 66.6°; normal, 66°; mean absolute moisture, 7.08 grains per cubic foot; normal, 7.01 grains.

Rainfall, 2.45 inches; normal, 1.97 inches; rain record days, 24; normal, 18; greatest rainfall in one day, 0.39, on the 24th; total at Luakaha, 15.44; normal, 11.02; at Kapiolani Park, 0.35; normal, 0.71.

The artesian well water level fell during the month from 33.80 to 33.30 feet above mean sea level; August 31, 1902, it stood at 33.10. The average daily mean sea level for the month was 9.78 feet, the assumed annual mean being 10.00 feet above datum; for August 31, 1902, it was 9.78.

Trade wind days, 31, (two of nne.); normal, 29; average force of wind during daylight, Beaufort scale, 2.1; average cloudiness, tenths of sky, 4.1; normal, 4.0.

Approximate percentages of district rainfall as compared with normal: Hawaii, Hilo district, 76 per cent; Hamakua, 60; Kohala, 107; Waimea, 57; Kona, about 120; Kau, 26; Puna, not reported; Island of Maui, 104; Oahu, variable, from 32 at Ewa to 145 at Honolulu; Kauai, 43 to 108. It will be seen by the foregoing that the precipitation was very unevenly distributed. The heaviest 24-hour rainfalls for the month were at Awini Ranch, Hawaii, 3.88, on the 5th, and Laupahoehoe, 3.52, on the 3d. The heaviest monthly rainfall was at Nahiku (850 feet elevation), 19.75; probably at the 1600 feet elevation at the same place it was from 30 to 50 per cent greater.

United States Magnetic Station, dew-point, 66.6°; relative humidity, 67.1 per cent; Kohala, dew-point, 67.4°; relative humidity, 78.3 per cent; trade wind days, 31. Naalehu, relative humidity, 76 per cent; barometer average, 29.43; highest, 29.52; lowest, 29.36; trade wind days, 30.

Earthquakes reported: Naalehu, 1st, 11:50 a. m; 4th, 9:45 p. m.; 21st, 4:20 a. m. Hilo, 1st, 11:40 a. m.; 4th, 9:55 p. m., the latter preceded by rumbling. Pepeekeo, 1st, 11:50 a. m. Kohala, 17th, 1 a. m.

Volcano House reports very dry weather.

Waimea and Pepeekeo report bright morning glow all the month.

A perfect lunar rainbow was seen at Kohala on the 30th at 10 p. m.

Pepeekeo reports east and northeast winds through the month; heavy surf 1st to 3d, inclusive.

In the summary for July the heaviest monthly rainfall was given as 38.20 inches at Puuohau, Hawaii, and noted at the time that Nahiku, Maui, probably had a greater fall; a delayed report from that station gives 40.58 inches, which was the heaviest for July.

CLIMATOLOGY OF COSTA RICA.

Communicated by Mr. H. PITTIER, Director, Physico-Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San José de Costa Rica, during August, 1903.*

Hours.	Pressure.		Temperature.		Relative humidity.		Rainfall.		
	Observed, 1903.	Normal, 1889-1900.	Observed, 1903.	Normal, 1889-1900.	Observed, 1903.	Normal, 1889-1900.	Observed, 1903.	Normal, 1889-1900.	Duration, 1903.
	Inches.	*Inches.*	° *F.*	° *F.*	%	%	*Ins.*	*Ins.*	*Hrs.*
1 a. m	26.16	26.14	62.4	63.4	94	91	0.04	0.03	2.00
2 a. m	26.16	26.13	61.9	63.3	93	91	0.02	0.02	0.67
3 a. m	26.14	26.11	61.5	63.2	93	91	0.02	0.02	1.00
4 a. m	26.13	26.11	61.2	62.6	93	92	0.04	0.01	1.00
5 a. m	26.13	26.11	60.8	62.4	93	90	0.04	0.02	1.00
6 a. m	26.14	26.11	60.6	62.1	92	91	0.02	0.03	1.00
7 a. m	26.14	26.12	60.6	62.4	92	90	0.00	0.05	.....
8 a. m	26.16	26.14	64.3	66.2	81	85	0.00	0.09	.....
9 a. m	26.17	26.15	68.5	69.3	73	78	0.01	0.05	0.17
10 a. m	26.17	26.15	72.1	70.7	69	73	0.01	0.09	0.17
11 a. m	26.17	26.15	74.4	73.8	64	70	0.00	0.13	.....
Noon	26.17	26.14	76.1	75.8	62	70	0.01	0.25	0.33
1 p. m	26.15	26.13	75.8	76.0	66	69	0.02	0.39	1.00
2 p. m	26.13	26.11	75.2	75.1	68	71	0.13	0.77	0.50
3 p. m	26.11	26.10	73.9	73.4	64	73	0.86	1.21	3.83
4 p. m	26.11	26.09	70.8	71.3	80	78	1.23	1.35	7.49
5 p. m	26.11	26.09	68.9	69.3	83	82	4.03	1.82	11.84
6 p. m	26.12	26.10	67.0	68.0	87	86	2.35	1.29	12.84
7 p. m	26.12	26.12	65.8	66.6	89	88	2.69	1.10	13.00
8 p. m	26.16	26.13	65.0	65.7	92	89	2.16	0.80	12.67
9 p. m	26.17	26.15	64.4	65.2	93	90	0.98	0.33	10.16
10 p. m	26.18	26.15	64.0	64.6	92	90	0.51	0.15	6.50
11 p. m	26.19	26.16	63.4	64.3	93	90	0.17	0.09	3.67
Midnight	26.19	26.15	62.8	63.9	94	90	0.09	0.05	3.00
Mean	26.15	26.13	66.6	67.5	85	84	.....	.....	.....
Minimum	26.06	26.01	56.1	55.8	44	.....	.....	.....	.....
Maximum	26.26	26.25	81.7	84.7	100	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	15.43	10.14	93.84

REMARKS.—At San José the barometer is 1169 meters above sea level. Readings are corrected for gravity, temperature, and instrumental error. The hourly readings for pressure, and wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The thermometers are 1.5 meters above ground and are corrected for instrumental errors. The total hourly rainfall is as given by Hottinger's self-register, checked once a day. Under maximum, the greatest hourly rainfall for the month is given. The standard rain gage is 1.5 meters above ground. Since January 1, 1902, observations at San José have been made on seventy-fifth meridian time, which is 0 hours, 36 minutes, 13.3 seconds *in advance* of San José local time. The normals for pressure, temperature, and relative humidity have been adjusted to this time; the normal for rainfall in Table 1 and the sunshine observations and normal in Table 2 refer to local time. At Port Limon the hours of direct observation are 8 a. m., 2 and 8 p. m., San José local time; the barometer is 3.4 meters above sea level. The means for temperature and relative humidity in Table 4 are obtained from two-hourly readings given by a Richard self-registering thermometer.

TABLE 2.—*San José, August, 1903.*

Time.	Sunshine.		Cloudiness.		Temperature of the soil at depth of—				
	Observed, 1903.	Normal, 1889-1900.	Observed, 1903.	Normal, 1889-1900.	6 inches.	12 inches.	24 inches.	48 inches.	120 inches.
	Hours.	*Hours.*	%	%	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*
7 a. m	11.77	8.32	58	56	69.4	70.0	71.0	70.6	70.7
8 a. m	19.23	18.32	.....	.....	.....	.....	.....	.....	.....
9 a. m	21.69	19.95	.....	.....	.....	.....	.....	.....	.....
10 a. m	21.32	17.86	74	76	69.6	69.9	71.0	70.7	.....
11 a. m	20.60	15.63	.....	.....	.....	.....	.....	.....	.....
Noon	18.85	12.97	.....	.....	.....	.....	.....	.....	.....
1 p. m	14.76	11.37	86	84	70.4	70.2	71.0	70.7	.....
2 p. m	15.11	11.22	.....	.....	.....	.....	.....	.....	.....
3 p. m	10.71	9.03	.....	.....	.....	.....	.....	.....	.....
4 p. m	7.89	5.87	95	88	70.8	70.5	71.0	70.6	.....
5 p. m	5.42	2.72	.....	.....	.....	.....	.....	.....	.....
6 p. m	0.56	0.83	.....	.....	.....	.....	.....	.....	.....
7 p. m	.....	.....	86	79	70.7	70.6	71.0	70.6	.....
8 p. m	.....	.....	.....	.....	.....	.....	.....	.....	.....
9 p. m	.....	.....	.....	.....	.....	.....	.....	.....	.....
10 p. m	.....	.....	81	89	70.6	70.5	71.1	70.6	.....
11 p. m	.....	.....	.....	.....	.....	.....	.....	.....	.....
Midnight	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean	.....	.....	83	74	70.3	70.3	71.1	70.6	70.7
Total	167.91	134.09	.....	.....	.....	.....	.....	.....	.....

TABLE 3.—*Rainfall at stations in Costa Rica, August, 1903.*

Stations.	Height above sea level.	Observed, 1903.		Averages.		
		Amount.	Number of days.	Number of years.	Amount.	Number of days.
	Feet.	*Inches.*			*Inches.*	
Sipurio (Talamanca)	60	.....	.....	3	11.69	18
Boca Banano	3	4.53	18	7	13.31	21
Port Limon	3	1.85	6?	9	14.61	21
Swamp Mouth	3	5.91	8	5	7.99	14
Zent	20	3.82	17	2	10.67	17
Siquirres	60	0.51	8	5	12.56	15
Dos Novillos	122	.....	.....	.....	.....	.....
Guapiles	300	10.63	18	3	18.47	20
Cariblanco (Sarapiqui)	835	.....	.....	5	22.20	25
San Carlos	161	13.62	22	5	14.37	24
Las Lomas	266	.....	.....	3	10.71	15
Peralta	332	13.46	23	4	13.15	20
Turrialba	620	1.97	9	7	10.56	18
Juan Viñas	1,040	3.11	20	6	8.53	12
Santiago	1,100	13.07	23	2	7.13	18
Paraiso	1,336	15.16	20	2	7.76	14
Cachi	1,020	11.97	20	.....	.....	.....
Las Concavas	1,337	13.42	27	2	6.93	19
Cartago	1,451	15.83	25	3	6.54	18
Tres Rios	1,300	19.72	24	13	9.10	18
San Francisco Guadalupe	1,187	.....	.....	7	8.62	20
San José	1,160	15.43	26	14	9.92	24
La Verbena	1,140	16.54	29	7	7.52	18
Nuestro Amo	791	13.07	20	7	7.01	14
Alajuela	950	16.69	24	3	11.30	11
San Isidro Alajuela	1,346	28.42	27	2	15.51	16
Las Cañas	780	.....	.....	.....	.....	.....

TABLE 4.—*Observations taken at Port Limon and Zent, August, 1903.*

Stations.	Pressure.			Temperature.			Relative humidity.
	Minimum.	Maximum.	Mean.	Minimum.	Maximum.	Mean.	
	Inches.	*Inches.*	*Inches.*	° *F.*	° *F.*	° *F.*	%
Port Limon	.....	.....	.....	.....	.....	.....	.....
Zent	.....	.....	.....	66.2	91.6	79.1	82

Stations.	Cloudiness.	Sunshine.	Rainfall.		Temperature of soil at depth of—		
			Amount.	Number of days.	6 inches.	12 inches.	24 inches.
	%	*Hours.*	*Inches.*		° *F.*	° *F.*	° *F.*
Port Limon	.....	.....	1.85	6?	.....	.....	.....
Zent	69	213.58	3.82	17	81.1	81.1	81.1

MEXICAN CLIMATOLOGICAL DATA.

By Señor MANUEL E. PASTRANA, Director of the Central Meteorologic-Magnetic Observatory.

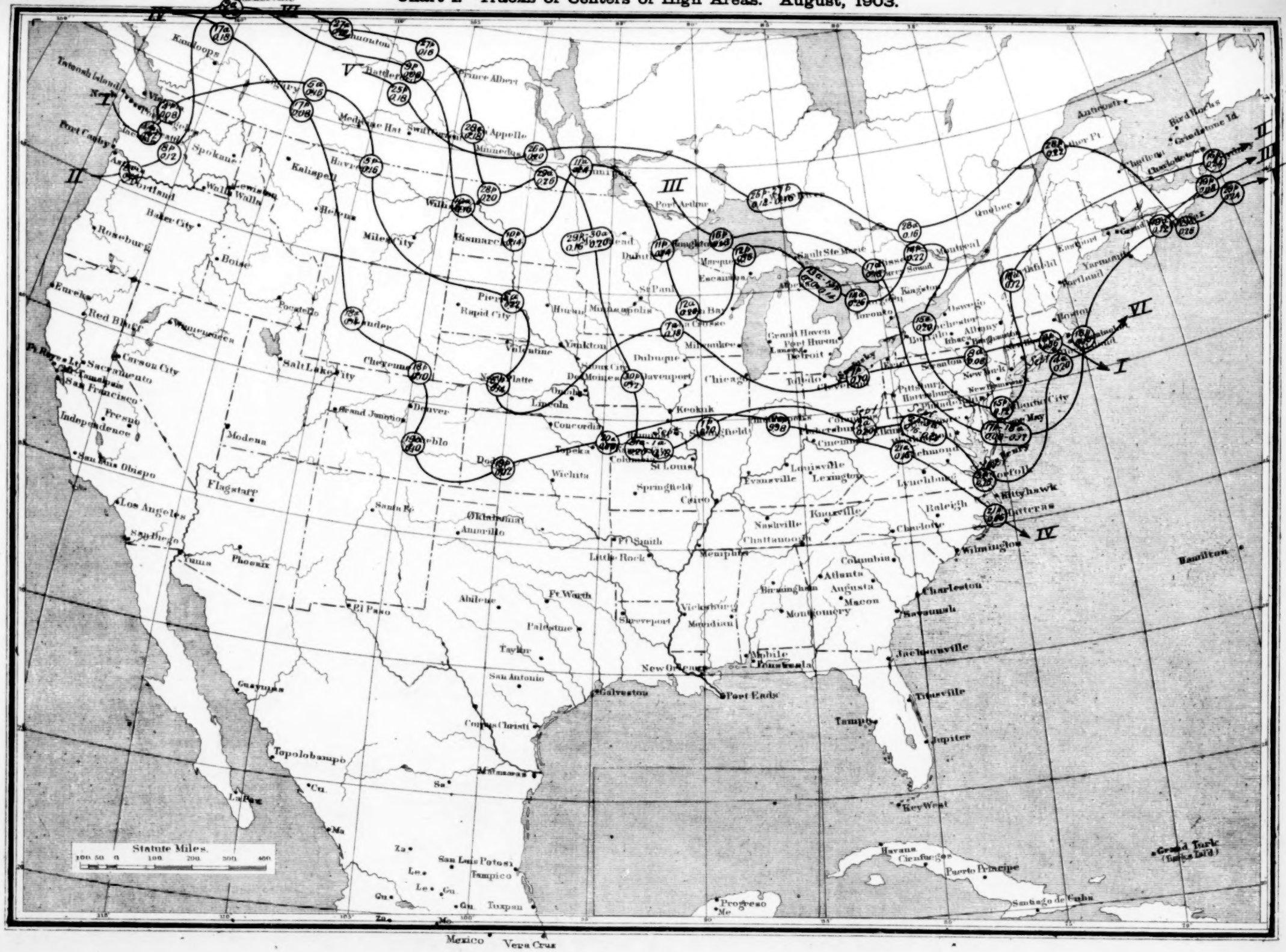
August, 1903.

Stations.	Altitude.	Mean barometer.*	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inches.*	° *F.*	° *F.*	° *F.*	%	*Ins.*		
Chihuahua	4,684	25.21	93.2	63.5	76.8	46	5.33	e.	.....
Guadalajara (Obs. del. Est.)	5,186	24.90	82.4	60.8	68.7	78	10.05	ne.	.....
Guanajuato	6,640	.....	.....	.....	.....	.....	.....	.....	.....
Leon (Guanajuato)	5,906	24.24	84.0	53.8	67.3	77	7.62	w.	.....
Mazatlan	25	29.81	91.0	73.0	83.7	78	11.25	nw.	.....
Merida	50	29.87	96.1	64.0	80.6	74	.....	ne.	.....
Mexico (Obs. Cent.)	7,472	23.04	75.2	50.4	61.5	73	4.41	nw.	e.
Mexico (E. N. Agric.)	7,442	.....	.....	.....	.....	.....	.....	.....	.....
Monterey (Seminario)	1,626	.....	.....	.....	.....	.....	.....	.....	.....
Morelia (Seminario)	6,401	23.90	74.3	52.5	61.0	79	4.11	se.	.....
Pachuca	7,959	.....	.....	.....	.....	.....	.....	.....	.....
Puebla (Col. Cath.)	7,108	23.33	75.9	48.2	60.4	81	5.31	se.	.....
Puebla (Col. d Est.)	7,118	23.32	75.9	47.7	60.8	76	6.69	e.	.....
Queretario	6,070	.....	.....	.....	.....	.....	.....	.....	.....
Toluca	8,812	.....	.....	.....	.....	.....	.....	.....	.....
Zacatecas	8,015	22.54	79.0	45.0	58.6	74	4.63	e.	.....
Zapotlan	5,078	.....	.....	.....	.....	.....	.....	.....	.....

*The monthly barometric means are reduced to the international standard of gravity.

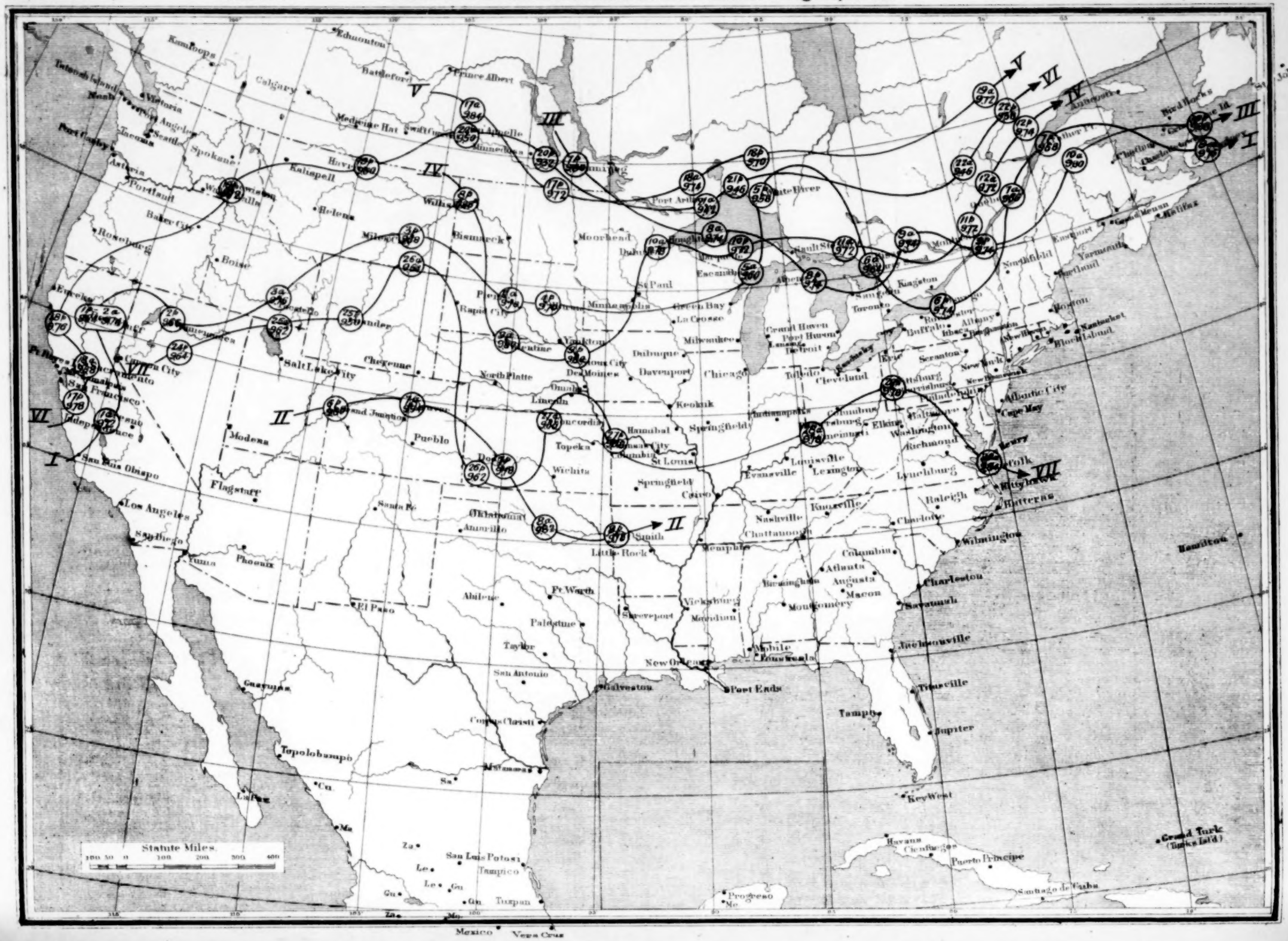
Chart I. Tracks of Centers of High Areas, August, 1903.
Blakerville
XXXI—83.

Chart I. Tracks of Centers of High Areas. August, 1903.


I
II
III
IV
V
VI
Barkerville
Kamloops
Tatoosh Island
Port Crescent
Port Angeles
Seattle
Portland
Spokane
Walla Walla
Lewiston
Kalispell
Helena
Baker City
Roseburg
Boise
Eureka
Red Bluff
Winnemucca
Pt Reyes Lt
Sacramento
San Francisco
Carson City
Salt Lake City
Fresno
Independence
Modena
Reno
Denver
Grand Junction
Pueblo
Flagstaff
Los Angeles
San Diego
Yuma
Phoenix
Santa Fe
Oklahoma
Amarillo
Dodge
Wichita
Concordia
Topeka
Omaha
Lincoln
North Platte
Valentine
Rapid City
Yankton
Pierre
Huron
Minneapolis
St Paul
Duluth
Marquette
Escanaba
Port Arthur
Prince Albert
Battleford
Calgary
Medicine Hat
Swift Current
Moosomin
Minnedosa
Qu'Appelle
Winnipeg
Bismarck
Miles City
Havre
Kamloops
Tatoosh Island
Port Crosby
Port Angeles
Abilene
Ft Worth
Palestine
Taylor
Shreveport
Vicksburg
Meridian
Monroe
Ft Smith
Little Rock
Memphis
Nashville
Knoxville
Chattanooga
Evansville
Louisville
Lexington
Cincinnati
Springfield
Cairo
St Louis
Keokuk
Davenport
Dubuque
Milwaukee
Chicago
Grand Haven
Port Huron
Detroit
Toledo
Cleveland
Buffalo
Rochester
Albany
Ithaca
Scranton
New York
Boston
Portland
Yarmouth
Eastport
Fredericton
Quebec
Montreal
Kingston
Toronto
Sault Ste Marie
Parry Sound
Escanaba
Marquette
Duluth
Huron
Minneapolis
St Paul
Rapid City
Yankton
Valentine
Omaha
Lincoln
North Platte
Concordia
Topeka
Dodge
Wichita
Amarillo
Santa Fe
Flagstaff
Los Angeles
San Diego
Yuma
Phoenix
El Paso
Abilene
Ft Worth
Palestine
Taylor
San Antonio
Galveston
Port Eads
New Orleans
Mobile
Pensacola
Shreveport
Vicksburg
Meridian
Montgomery
Atlanta
Birmingham
Augusta
Macon
Columbia
Charleston
Savannah
Jacksonville
Tallahassee
Tampa
Jupiter
Key West
Havana
Cienfuegos
Puerto Principe
Santiago de Cuba
Grand Turk (Turks Isld)
Hamilton
Bermuda
Wilmington
Hatteras
Kitty Hawk
Norfolk
Richmond
Lynchburg
Roanoke
Knoxville
Raleigh
Charlotte
Chattanooga
Nashville
Louisville
Evansville
Cairo
Springfield
Quincy

• Barkerville

Chart II. Tracks of Centers of Low Areas. August, 1903.



• Barkerville

Chart III. Total Precipitation. August, 1903.

Barkerville

Chart III. Total Precipitation. August, 1903.

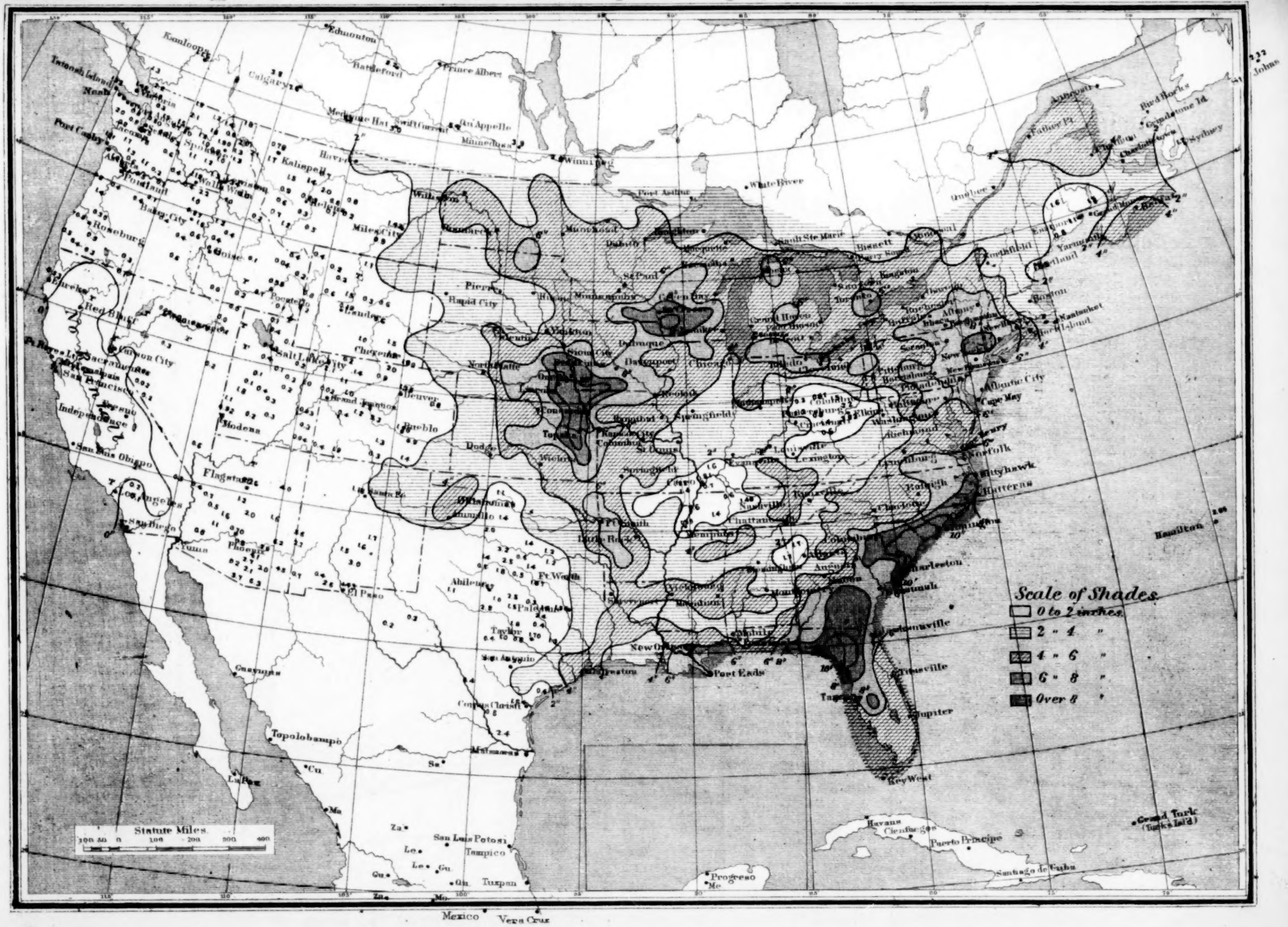
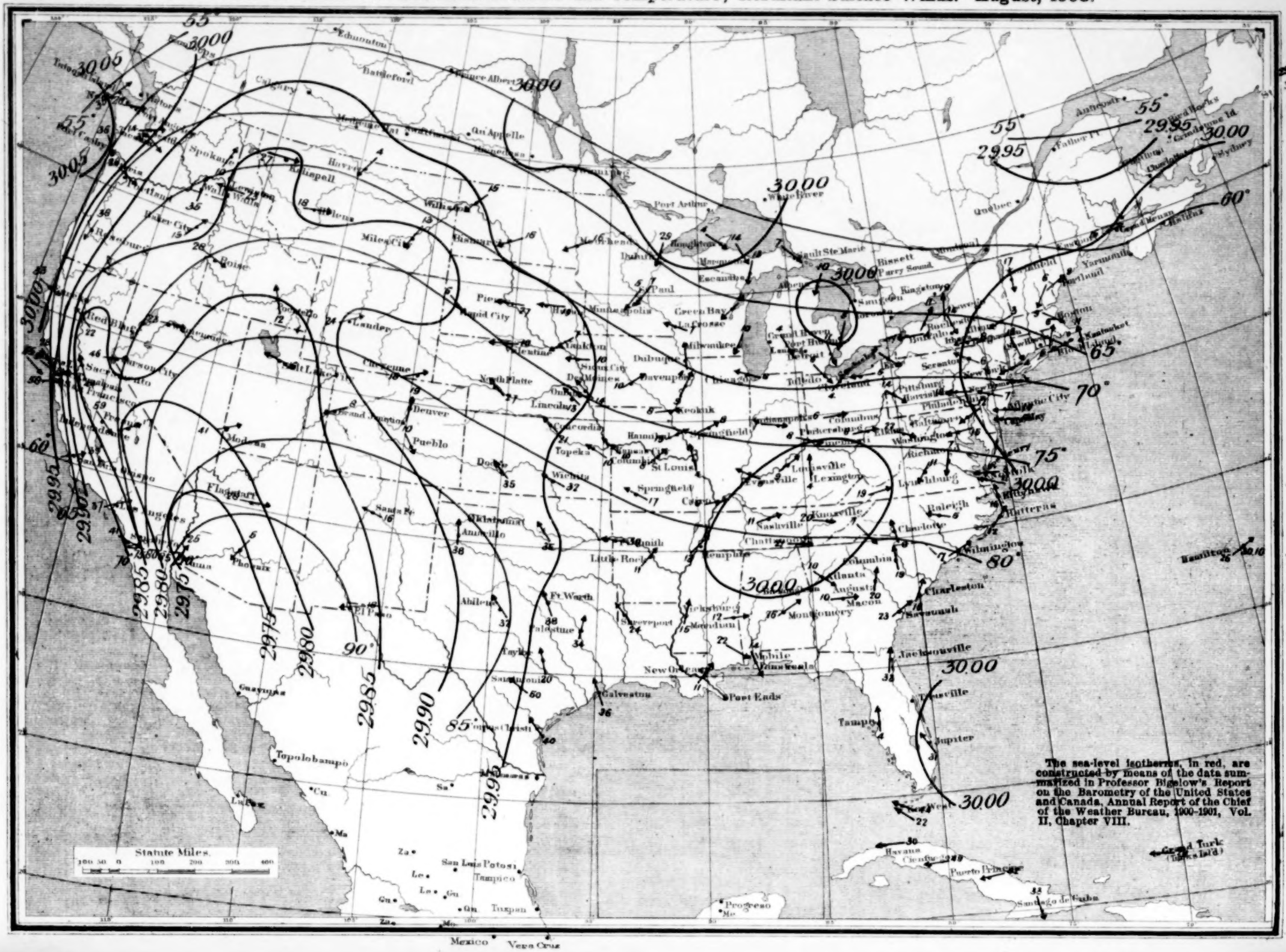


Chart IV. Sea-Level Pressure and Temperature; Resultant Surface Winds. August, 1903.



The sea-level isotherms, in red, are constructed by means of the data summarized in Professor Bigelow's Report on the Barometry of the United States and Canada, Annual Report of the Chief of the Weather Bureau, 1900-1901, Vol. II, Chapter VIII.

Chart V. Hydrographs for Seven Principal Rivers of the United States. August, 1903.

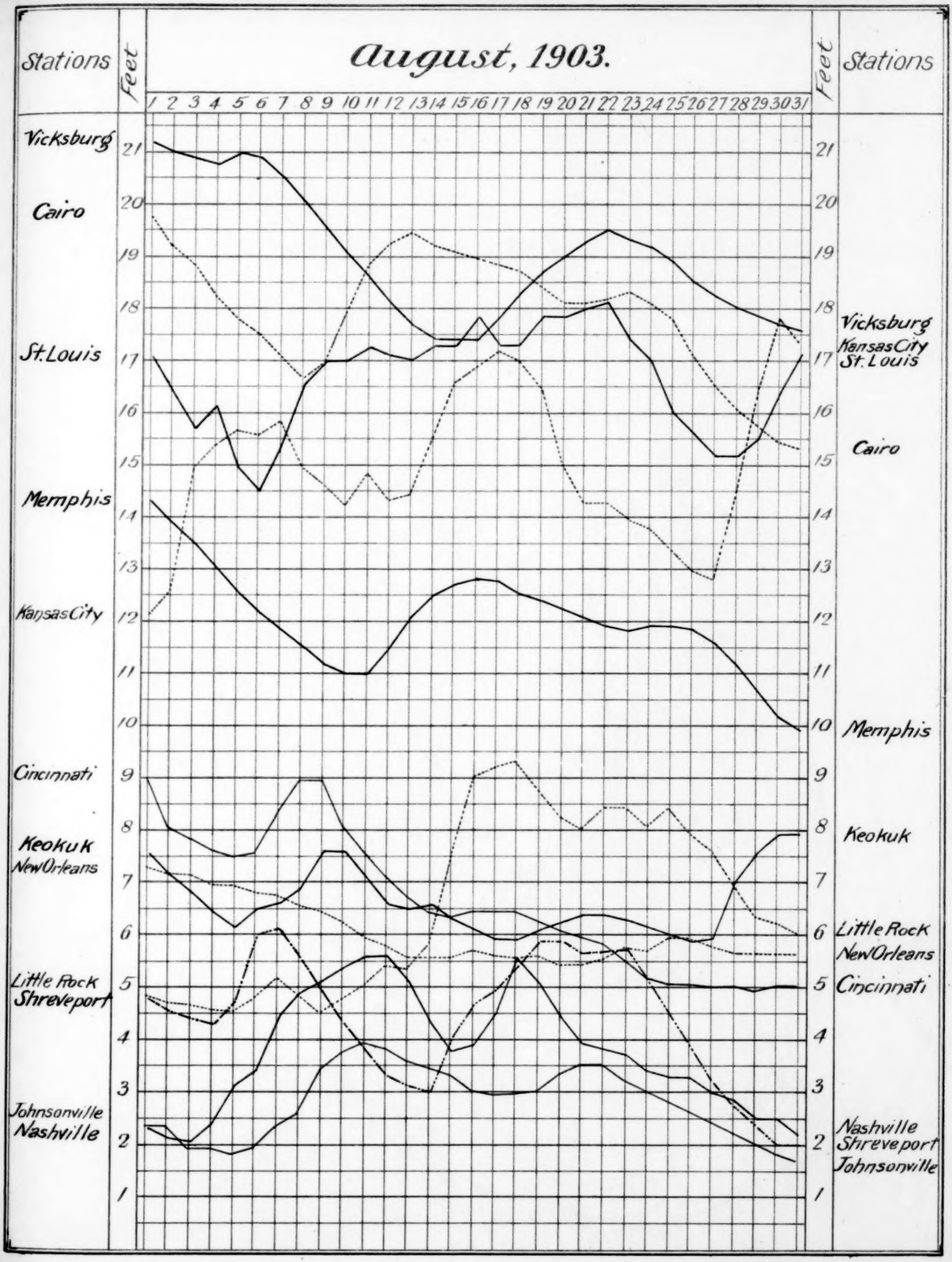


Chart VI. Surface Temperatures, Maximum, Minimum, and Mean. August, 1903.

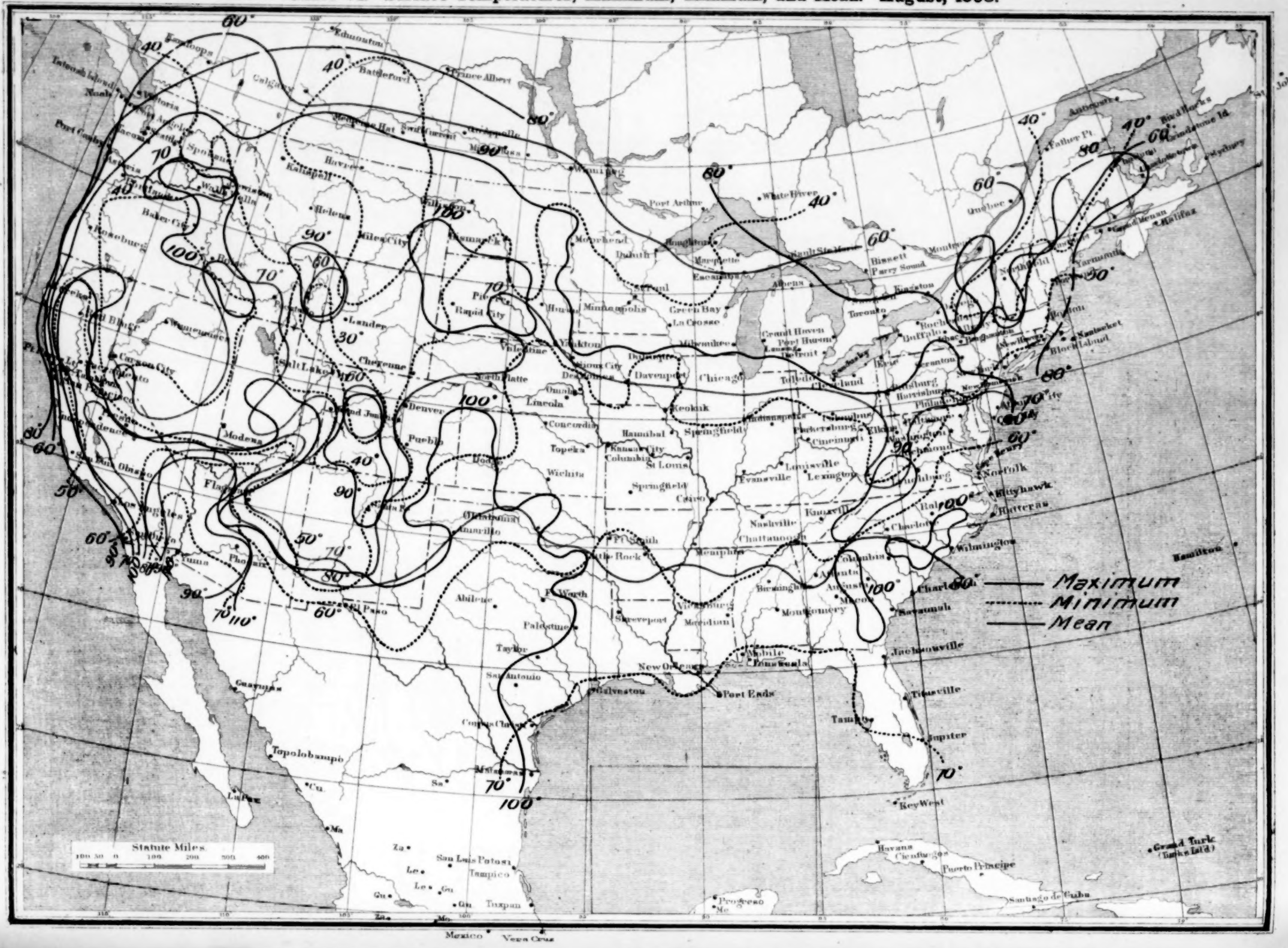
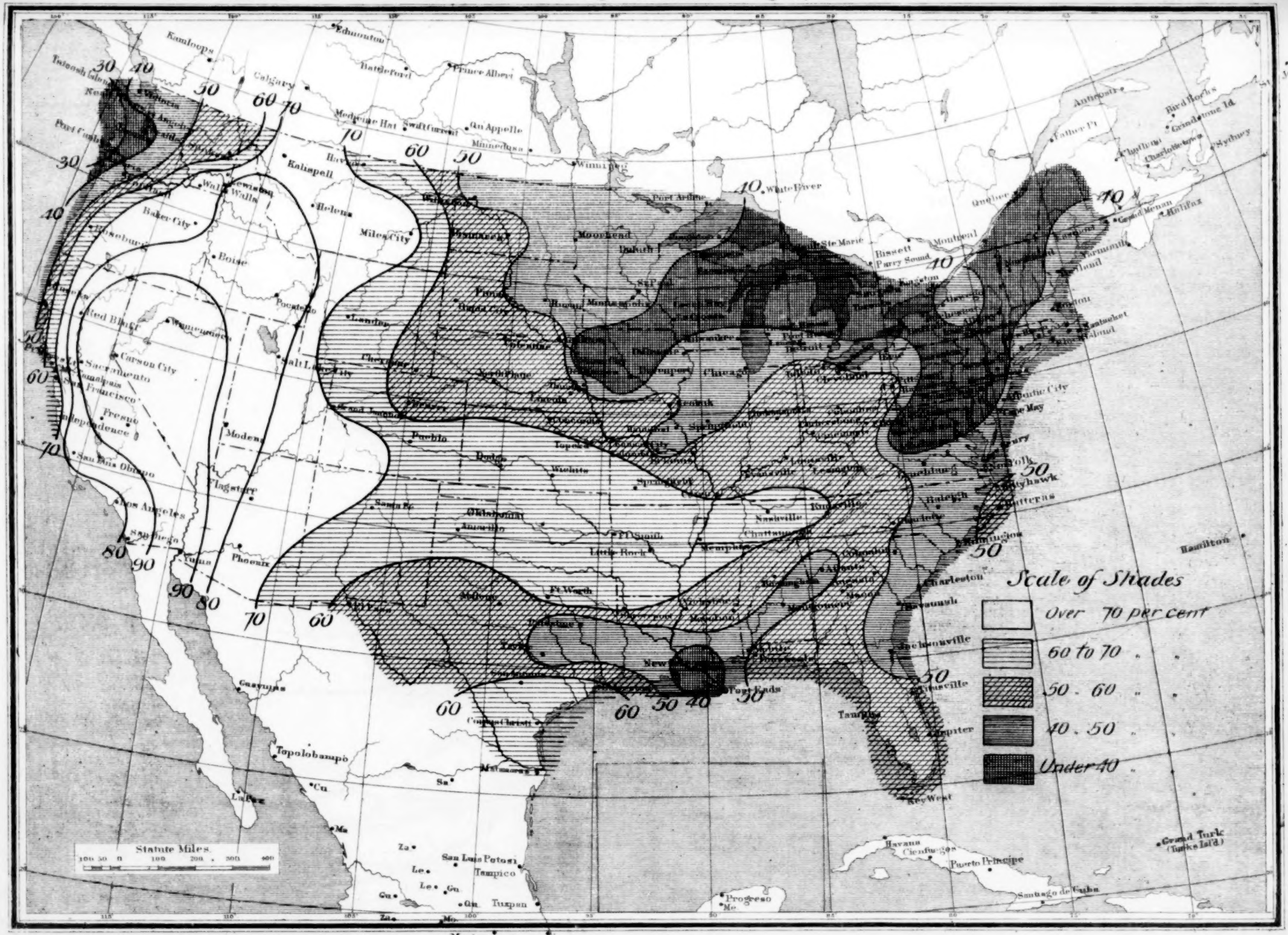


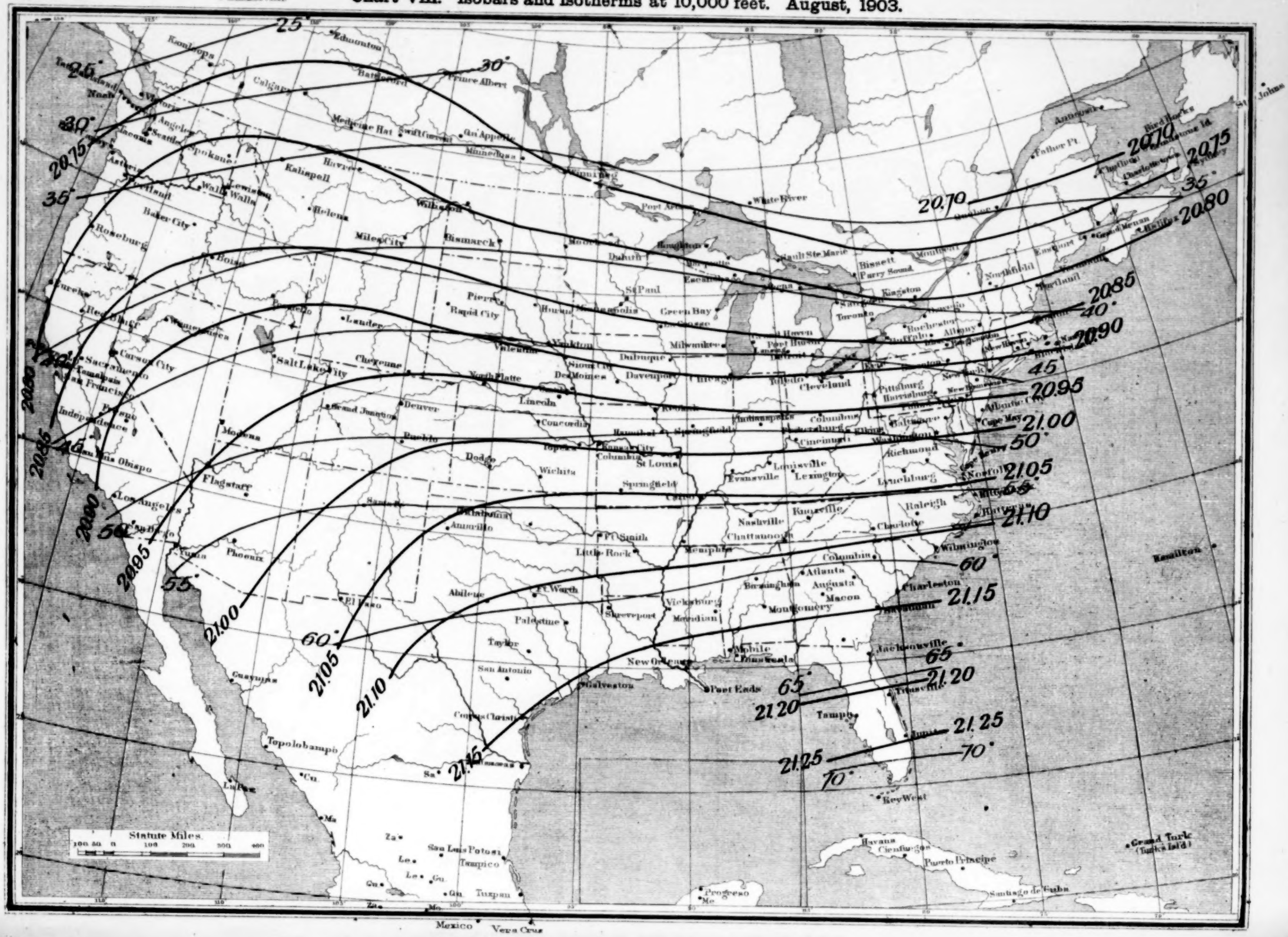
Chart VII. Percentage of Sunshine. August, 1903.

Chart VII. Percentage of Sunshine. August, 1903.



• Bakkerville

Chart VIII. Isobars and Isotherms at 10,000 feet. August, 1903.

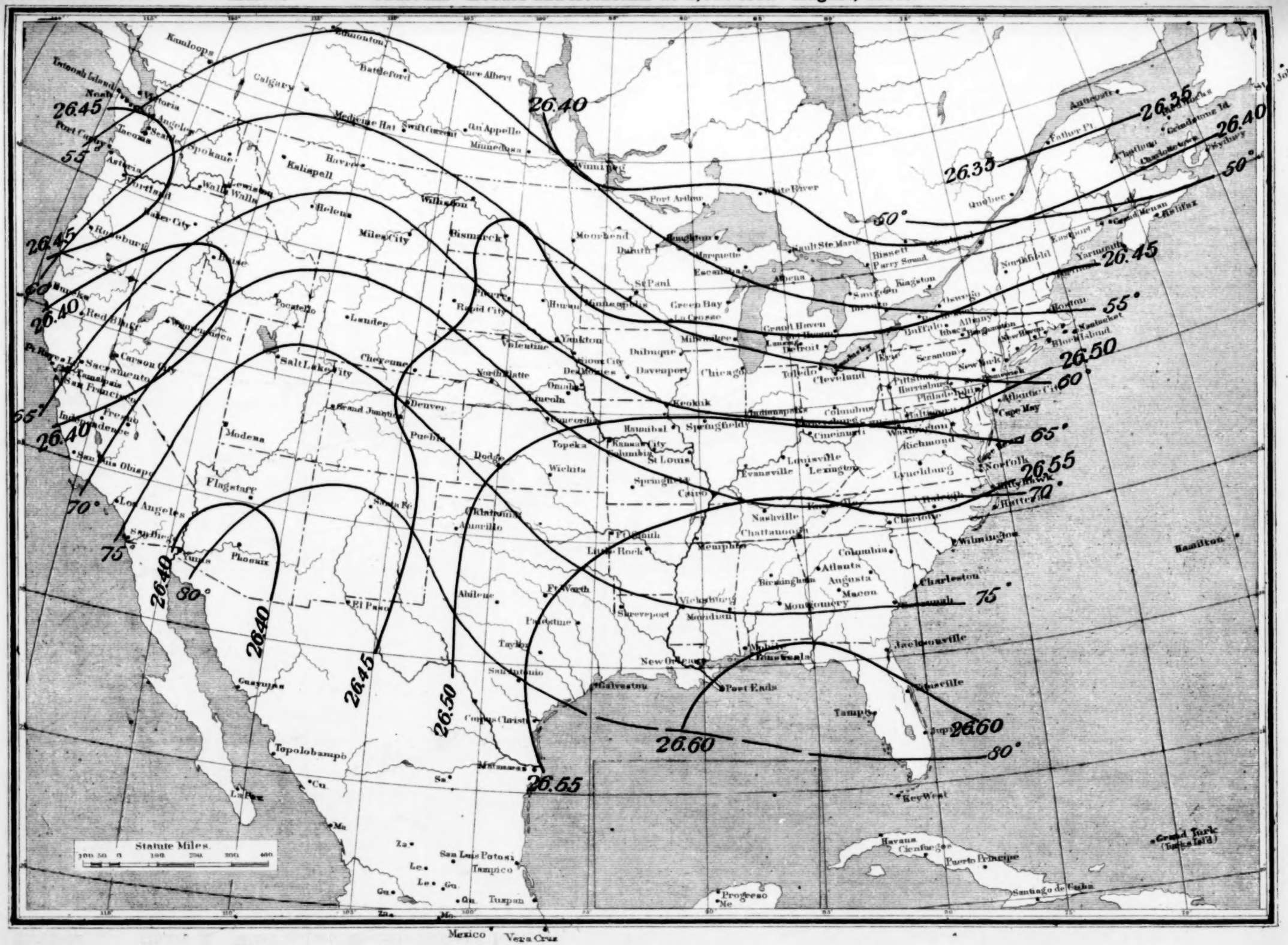
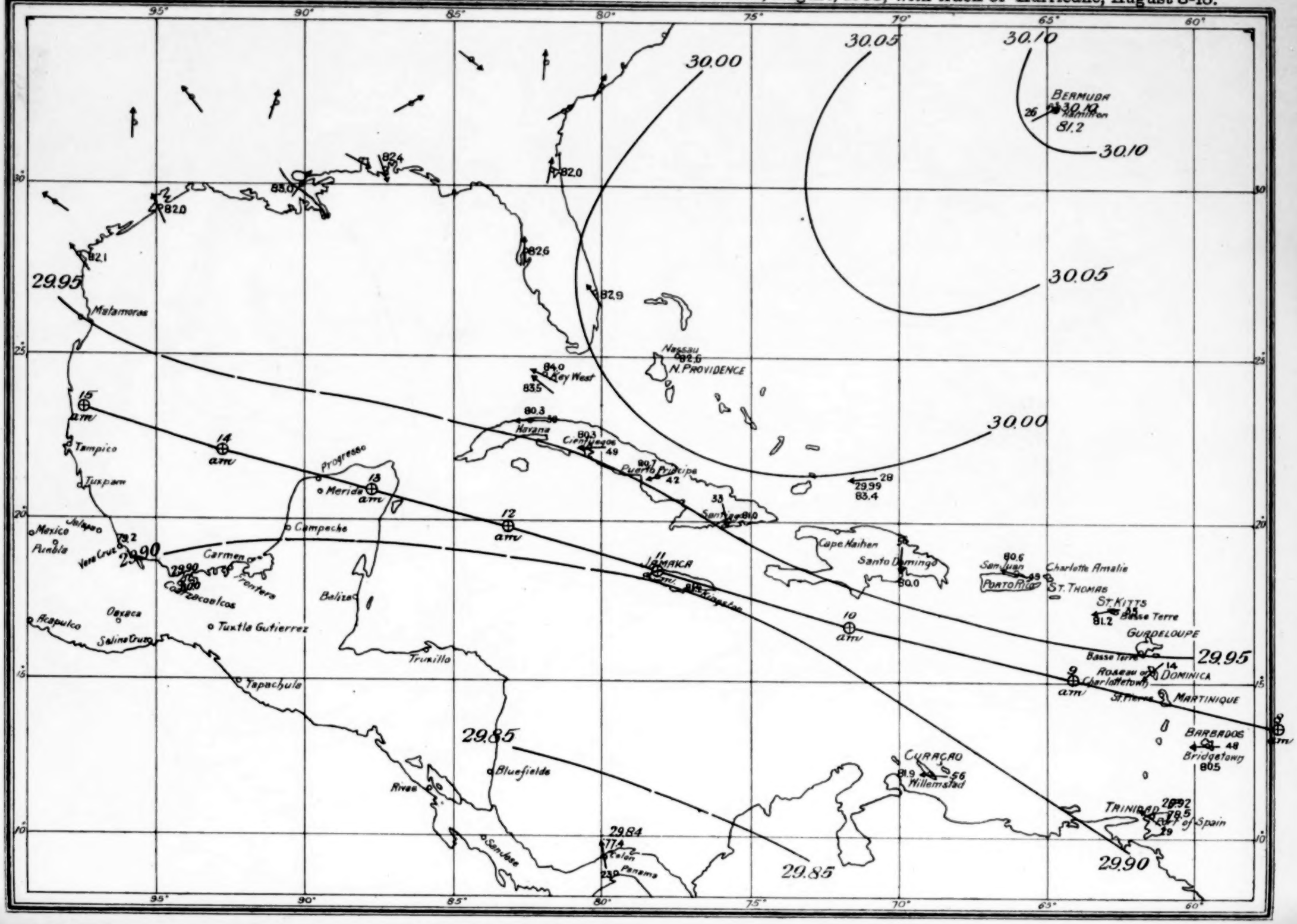


• Bakkerville

Chart IX. Isobars and Isotherms at 3,500 feet. August, 1903.

• Barkerville

Chart IX. Isobars and Isotherms at 3,500 feet. August, 1903.



XXXI—92. **Chart X. West Indian Monthly Isobars, Isotherms, and Resultant Winds, August, 1903, with track of Hurricane, August 8-15.**